PAST STUDIES

Chen Minghua

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Hangzhou, China

1. Summary

As a child, I dreamed to become Einstein No 2. And still this is my lifetime goal. In any case I shall keep myself competitive technically and scientifically in one way or another. Unfortunately I didn't continue with my PH.D. studies at one of the best universities in the world for private reason. My then girlfriend was a Taiwanese and her English or German or French was near zero, therefore I gave up my doctoral study plan and instead got a job in Taiwan (Bechtel's joint venture with the Ministry of Science in Taiwan). I also didn't go to work in Taiwan due to dramatical change later on.

Nevertheless, I have been able to pursue a master study of thermophysics at one of the best universities in China, have learned four or five foreign languages, paving the way for to acquire information of the outside world without any difficulty and obstacle from any organizations. I have also learned almost all software and Internet technologies, enabling me design websites and related functions, so that I may promote my business without a third hand. Of course I've also learned a lot of other stuff, some are still useful, the majority is sleeping forever.
Over the last years I've completed my master degree at one of the best universities in China, acquired four or five foreign languages, acquired wide spectrum of knowledge power, energy, IT and Internet, aviation and other industries. My knowledge is mainly based on three pillars – thermophysics, IT and languages.

My past researches and studies were centered around the above three, with special attention to solar technology, thermal science and Internet technologies.

And in the future, I will more or less concentrate on thermodynamics, starting from solar applications, and later to be extended to all other areas of human knowledge.

2. WHY SCIENCE?

People may be curious about my decision to turn to scientific research after long career in the business. In fact, I can summarize it as follows:

- Business and politics are full of lies, betrays and crimes
- Science is the only area which can find something exciting to me.
- It is also the best profession fit to my personality
- My desire to understand the Nature better and to know GOD better
- My continuous learning desire

Why do I plan to return to Universities or institutes for scientific researches?

The main reason of this fundamental change of my life and career is my firm belief that only the acquaintance with science and studies of the Nature can give me some sort of satisfaction and happiness. In my childhood, I have always been thinking about becoming a top scientist and this is still my unrealized dream. I am thirsty to

learn everything about the Nature and her principles. All branches of sciences are attracting me – mathematics, physics, chemistry…. When dived into the realm of science, I forget the rest of the world.

Secondly, I've found the industry, commerce and politics all full of crimes, evils, lies, corruption and injustice (in fact they are synonyms) , and I hate all these, therefore, after so many years there, I want to keep myself distant away from them and concentrate myself on pure scientific researches.

Thirdly, my personality is very fit for scientific researches. Although working in the industry and business over the last two decades, I am still maintaining my habit to learn new sciences every day without interruption. My reading and study capability is unique. Each day I might read more than 100 pages of books of various kinds. I am able to read papers in English, German and French and I am still improving my Russian.

And lastly, I should have been among the top scientists if I have accepted the Ph.D studies I won from several European and N. American universities such as University of Glasgow (gas turbine combustion), University of Paris (surface chemistry), Laval University, and universities of Germany and other countries during 1991-1992 shortly after graduation as a master of science. I was unable to attend these universities because of private reasons Further in 1996, I was nearly admitted by Harvard to pursue a MPA when my former boss told me that the job at Alstom was worth more than a Harvard MPA, a wrong judgment of course.

For short, only a scientific career can fulfill my dream of lifetime endeavors.

3. PREVIOUS RESEARCHES

Earlier I have also carried researches on a wide variety of topics such as

- nano and microfluidics
- CFD – Computational Fluid Dynamics
- (2008) Thermodynamics with special interests in mesoscopic thermodynamics (thermodynamics of small structures– such as porous media, cells, surface and interfaces, molecules, quantum, nucleation, and nano-structures)
- thermodynamics of cancer
- biothermodynamics with focus on human,
- Thermodynamics of Biosystems, Human Life, Health and Diseases particularly Cancers – its theory, prevention, diagnosis, monitoring, therapy and rehabilitation; thermodynamics applications in general;
- Thermodynamics of Biology, Life, Health and Diseases particularly Cancers – its theory, prevention, diagnosis, monitoring, therapy and rehabilitation; thermodynamics applications in general;
- Thermodynamics of Life, Biology and Health; thermodynamics applications in general;
- (2009-2008) Thermodynamics of the sun (in particular thermodynamics of corona heating and solar wind) and solar energy use (solar photovoltaics and solar heating)
- (2009-2008) Thermal Physics in Solar Photovoltaics: thermal physics in the process of research, development, manufacturing and operation of solar silicons, wafers, cells, modules and systems
- thermodynamics of the Sun (solar thermodynamics) with focus on solar corona heating and solar wind problems

- (2009-2008) Thermodynamics of the sun (in particular thermodynamics of corona heating and solar wind) and solar energy use (solar photovoltaics and solar heating)
- solar physics, incl standard solar model (SSM) and the neutrino problems
- (2008-2007) Solar physics with special interests in solar model, corona heating and solar wind, incl. basic theory and technologies and tools used for understanding the physical phenomenon of the Sun and the space and atmospheric thermal physics owing to the sun radiation.
- (2008-2007) Solar physics with special interests in solar model, corona heating and solar wind (2004)
- (2007) Solar radiation and its measurement technologies
- solar radiation and human health and solar therapy
- solar radiation and its measurement, incl ground based and orbiting satellites and other radiation measurement technologies and systems
- (2008-2007)Sun to Human Life: everything the Sun is related to human society, such as healthcare, science, technology, literature, religion, politics, wars, art, commerce and business, a very extensive topic
- (2008) Thermoeconomics, (exergoeconomic) and exergetic analysis
- (2009-2008) Thermal Physics in Solar Photovoltaics: thermal physics in the process of research, development, manufacturing and operation of solar silicons, wafers, cells, modules and systems
- photovoltaics and daylighting
- (2006-2003) Solar photovoltaics
- solar aircrafts and solar spacecrafts, solar airships, balloons, solar ion propulsion, light propulsion, solar sails etc
- (2007)Solar Aircrafts; Solar Airships: about solar airships, aerostats, balloons, blimps etc; Light Ion Propulsion; Light Sails; Space Photovoltaics.
- SO2 pollution control etc
- (1989-1986) Thermophysics with special topic of air pollution control in coal combustion
- (1989-1986) Thermophysics with special topic of air pollution control in coal combustion and thermal pipes
- Cryptography and Internet security applications
- (2009) Cryptography and Internet security applications

I've written a 300+ page "Thermodynamics Literature Review" in English (unpublished) and many other articles, but so far no publications were completed except some drafts.

4. micro/nano flows

Currently I am working for the nano science and technologies industries as the Senior Engineer, at NanoAge (China) Technologies (Hangzhou, China). My duties, among others, are to provide various researches, engineering, design and consulting services for the nanoscience and nanotechnology communities incl nanofluidics based on Computational Fluid Dynamic (CFD) - computational nanofluidics. These services help nano-manufacturing and processing by optimizing the fluid dynamics and thermodynamic parameters involved in the fabrication of nanochannels and nanotubes. Market intelligence services for international clients are also being provided as well as technological transfer.

Apart from nanofluidics, I've also collected experiences in other areas of the fluiddynamics such as the theoretical and experimental fluid mechanics. As a master of engineering in thermophysics, fluiddynamics was among one of the key courses. My studies of fluid dynamics were not limited to hydrodynamics but were extended to aerodynamics with the course of gas turbines and steam turbines. In my studies of international combustion engines, fluid dynamics was also the key theory to understand the mechanism of the combustion process. Fluiddynamics also has played key roles in other studies of the thermal engineering, such as steam boilers, compressors, pumps and valves, pipes and heat exchangers, etc. Later in my career as engineer at major multinationals and domestic design institute and powerplant, this part of science was intensively applied to fulfill my tasks.

4.1. MISSION - NANOFLUIDICS

Nanofluidics – its fundamental theory and applications to science and technology – incl transport, separation and molecular detection and capture.

My specific interest will be in developing theories to adequately describe the phenomenon of fluid flow at nanoscale where continuum theory may not be applicable. Molecular dynamics simulation, quantum mechanics and probability functional or other statistical methods will be explored. Computational Nanofluidics – numerical solutions based on the above will also be my focus.

Special interests will be put on the transmembrane transport of cells, to identify possible properties of cell cycles with important factors on human disease and health.

My research will focuses on NanoThermodynamics.

My question remains what can thermodynamics do for the nanoscience and how new theories shall be developed to adapt to the new dimension.

I am also n writing the book titled "NanoThermodynamics – a Comprehensive Review".

This book will summarize all thermodynamic topics related to the nano-technologies, mainly in three areas – nanoscale thermodynamics, thermodynamics of nano-materials and thermodynamics of nano-technologies.

They can further be subdivided into many sections, for example (incmplete)

- Hill's nanothermodynamics
- Tsallis thermodynamics
- Thermodynamics of Nano / Nanosize -systems
- Thermodynamics of Nano-Processes
- Thermodynamics of Nanomanufacturing / Nanofabrication
- Thermodynamics of Nano-engineering
- Thermodynamics of Nanomeasurements
- Thermodynamics of Nano scale characterization
- Thermodynamics of Nano-Phases
- Thermodynamics of Nanoelectronics
- Thermodynamics of Nanobiotechnology
- Thermodynamics of Nano Tools
- Thermodynamics of nanocanonical constraints
- Thermodynamics of nanoclays
- Thermodynamics of Nanodots
- Thermodynamics of Nanostructures
- Thermodynamics of Nano-materials
- Thermodynamics of Nano-Porous Materials
- Thermodynamics of Nanocrystals / Nanocrystalline materials
- Thermodynamics of nanocomposites
- Thermodynamics of Nanoparticles
- Thermodynamics of nanofibres
- Thermodynamics of Nanodroplets
- Thermodynamics of Nano-fluids
- Thermodynamics of Nano-Products
- Thermodynamics of Nano-components
- Thermodynamics of Nanodevices

Etc.

The book will describe each of these topic in full details: basic theory, research and application status. Key scientists, main problems, further research plans, problems.

I am planning to complete the writing of this book in two years.

4.2. WHY FLUID DYNAMICS OF NANO-SCIENCE & TECHNOLOGY ?

Nano-science and nano-technology have not only become a fashion and an investors' favorable area, but they also will play important roles in the future development of technologies and sciences. To understand the flow process in this domain will help the entire nano science and technologies. Nanofluidics involve the majority of nano-processes, hence is vital to the nano engineering, incl. those in the bioengineering.

4.3. AREAS OF INTERESTS

My special favor is flow in constrained space – porous media, small structures and micro- and nanofluidics and non-Newtonian flow.

My current researches and design are on CFD – Computational Fluid Dynamics.

My special interests lie in the studies of convergence, stability and efficiency of the various numerical methods involved in various types of fluid dynamics.

Earlier I have also carried researches on a wide variety of other topics such as

- thermodynamics of small systems – such as porous media, cells, surface and interfaces, molecules, quantum, nucleation, and nano-structures
- thermodynamics of cancer
- biothermodynamics with focus on human,
- thermodynamics of the Sun (solar thermodynamics) with focus on solar corona heating and solar wind problems
- thermoeconomics (exergoeconomic) and exergetic analysis
- solar physics, incl standard solar model (SSM) and the neutrino problems
- solar radiation and its measurement, solar radiation and human health and solar therapy
- photovoltaics and daylighting
- SO2 pollution control etc

All the above researches are being done on my own with no involvement of any research institutes.

5. CFD

Fuiddynamics Skills

I've strong background in both theoretical and experimental fluid mechanics. As a master of engineering in thermophysics, fluiddynamics was among one of the key courses. My studies of fluid dynamics were not limited to hydrodynamics but were extended to aerodynamics with the course of gas turbines and steam turbines. In my studies of international combustion engines, fluid dynamics was also the key theory to understand the mechanism of the combustion process. Fluiddynamics also has played key roles in other studies of the thermal engineering, such as steam boilers, compressors, pumps and valves, pipes and heat exchangers, etc. Later in my career as engineer at major multinationals and domestic design institute and powerplant, this part of science was intensively applied to fulfill my tasks.

CFD related background

As early as in my graduate studies time I was already interested in and studied a little about the blood dynamics or hemodynamics in order to find out the causes of headache suffered by my mother. And still today, I am always interested in this subject, and wants to learn the mechanism of blood flow throughout the human body and its many factors and influences to health.

I have demonstrated computational skills over the past in my work and studies, incl. among other, also high performance computing and parallel numerical simulations. During the last years, I have also been involving in the computational modeling of various industrial and commercial systems, facilities and equipments, as well as complex multiphase flow in various processes and systems.

As an enthusiast of computational science (mathematics, physics etc) I have been following this branch of science ever since my graduation in 1983, in my work as well in my part-time studies as one of my key hobbies and interests. During these years of CFD career, I have developed and upgraded several existing CFD models specific to the industries and applications.

MY CFD-philia is not just centered around fluid mechanics, rather spreads over to other branches of the thermophysics – heat and mass transfer, and combustion.

5.1. RESEARCH & DESIGN INTERESTS

My current researches and design are on CFD – Computational Fluid Dynamics.

My special interests lie in the studies of

- convergence,
- stability and
- efficiency

of the various numerical methods involved in various types of fluid dynamics.

My special favor is the

- non-Newtonian flow and
- flow in constrained space –
  - porous media,
  - small structures and
  - micro- and nanofluidics.

5.2. CFD CAPACITY

5.2.1.Fluid Dynamics and related sciences

- Aerodynamics
- Combustion, turbulent combustion
- Compressible flow
- Fluidized Beds
- Incompressible flow
- Micro/nano -fluidics
- Multi-phase and multi-component flow
- Non-Newtonian flow, Rheology - Rheological modeling for non- Newtonian fluids
- Pneumatic conveyors, bulk granular material handling
- Porous media flow
- Turbulent fluid flow / mixing and modeling / evaluation

5.2.2.Numerical theory and techniques

- Boundary Element Methods (BEM)
- Discrete Element Method (DEM)
- Direct Numerical Simulations (DNS)
- Finite Difference Methods (FDM)
- Finite Element Methods (FEM)
- Finite Volume Methods (FVM)
- Moving Interface Methods (MIM) such as
  - Sharp Interface Method (SIM)
  - Level Set Method (LSM)
- Probability Density Function (PDF)
- Adaptive, unstructured mesh CFD

5.2.3.CFD theory and techniques

- Detached Eddy Simulations (DES)
- Lattice Boltzmann CFD
- Large Eddy Simulation (LES)
- Reynolds Averaged Navier Stokes (RANS)
  - U-RANS
  - hybrid RANS/LES
- Reynolds Stress Model (RSM) model
  - Anisotropy-invariant Reynolds Stress Model of turbulence (AIRSM)
- Sliding mesh techniques
- Smoothed Particle Hydrodynamics (SPH)

5.2.4.CFD expertise

5.2.4.1. CFD consulting

My duties and responsibilities were/are:

- Specialist consultation
- Project consultation
- Process simulation and design
- Process, design, equipment optimization
- Thermodynamic cycle analysis
- Fluid flow and heat transfer analysis - 3-D fluid field analysis
- Software technical support

5.2.4.2. CFD development

Whereby I was involved in:

- Developing numerical algorithms and approaches
- Developing and implementing computational fluid dynamics codes
- Defining computational requirements
- Modeling and simulating various processes
- Documenting results
- Conducting data analysis and interpretation
- Performing post processing & visualization

5.2.4.3. CFD related processes and subjects

Flow Processes covered:

- Chemical reaction flows
- Fuel-air mixing processes
- Industrial processes
- Nucleate boiling
- Porous materials
- Sustainable energy systems
- Thermal flows
- Transport phenomena

5.2.4.4. CFD Related Systems and Equipments

- Boilers
- Burners
- Ducts and pipes
- Heat exchangers incl. condensers
- Pumps
- Steam/hydro turbines
- Thermal Energy Storage

5.2.4.5. CFD Relevant Industries and Areas of Applications

- Automobile
- Buildings
- Electronics
- Energy and Power
- Environment

5.2.5. CFD applications & tools

CFD applications (solver) such as

- Ansys: Ansys Workbench, Ansys CFX
- Fluent
- NUMECA
- OpenFoam
- Phoenix
- StarCD

CAD Software

- Pro/E
- solidworks

the most prevalent pre-processors

- Gambit
- ICEM-CFD

CFD post-processor

- EnSight

6. FLUIDDYNAMICS

After more than 20 years of explorations I've decided to fix my research and business to fluid dynamics with:

- Primary focus on fluid dynamics of small systems, Non-Newtonian, and other weird systems and
- Secondary focus on computational theory

I plan to write

- one book and
- one article

which shall be remembered and cited by all the academia and by 20% of the world population.

I plan to discover something new in the fluid dynamics theory or rather fluidics (fluid science), not just to write

hundreds of useless paper or books, only to be forgotten by all.

To contribute to the development of the fluid science particularly in the area of nanofluidics and biofluidics. Turbulent flow is also among my greatest interests.

6.1. WHY FLUID DYNAMICS?

The world is composed of three matters: solid, fluid and something between. Therefore if you understand liquid well, you understand a third of the world already.

On the other hand, fluid dynamics is one of the fundamental sciences of the mechanical engineers, to which I belong.

6.2. WHY FLUIDDYNAMICS RESEARCHES???

The reason to focus on fluiddynamics has been complex.

- it belongs to one of the fundamental science of the thermal physics chapter
- I have learned it very intensively over the past and
- my business over the last couple of years are related to this area.

7. NanoThermodynamics

My research will focuses on NanoThermodynamics.

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Etc.

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I am planning to complete the writing of this book in two years.

I am writing this letter to talk about a Research on NanoThermodynamics at your group or for your considering my funding applications for my researches on NanoThermodynamics at your Fund.

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8. Mesoscopic thermodynamics (thermodynamics of small structures, 2008-2009)

8.1. My General Plan

1) Understand thermodynamic science in its entirety, incl. all its branches. For this purpose I have prepared a comprehensive list of thermodynamics literature available as a first guide to my studies. I have also collected thousands of papers and articles in different parts of Thermodynamics arranged in the same order as the literature index, so that all my future research can be carried out these bases.

2) Carry out special research on some selected topics of thermodynamics. My final decision is to carry out researches on **Thermodynamics of the Universe**, details see below.

3) Write the **Thermodynamics Review** books. This will only be realized at time of maturity – that is, when I feel ready.

8.2. Special Researches – Thermodynamics of Small Systems

This is the first priority of my plan and shall be executed in advance.

I won't try to reason about this final decision in great details. However, it is based mainly on my personal flavor as well as my firm belief that exploration of the miniature structure will eventually benefit the human kind too, and some of the scientific achievements can be readily applied to social and technological progress. When making this decision, no consideration of economic outcome, environment and energy impact as well as food shortage and health problems facing the human race were made.

The Thermodynamics of Small Systems (TOST) will be a complete science branch of the thermodynamics as a whole. It will establish theories, laws and rules governing the thermodynamic activities of the following:

- ✧ The surface and interface thermodynamics
- ✧ The thermodynamics of porous media
- ✧ The thermodynamics microscopic and microcanonical systems
- ✧ The thermodynamics mesoscopic systems
- ✧ Thermodynamics of cells and molecular clusters
- ✧ The thermodynamics nano-scale and nano-science
- ✧ The thermodynamics of molecules
- ✧ The thermodynamics of atoms, quantums and particles

- And other small structures

My TOST research will be carried out stepwise.

The first three years (2009-01-01-2011-12-31) will be concentrating on special areas of nano-scale thermodynamics and then the configuration of the complete nano-scale thermodynamics branch around 2011-01-01 to 2013-12-31. Afterwards, the research and studies will be extended to other areas at the nano and nuclear scenario. .

During the first one to two years (2009-01-01 to 2010-12-31), two areas of researches will be chosen, namely:

- Thermodynamics of nano-structure
- Thermodynamics of nano-science and technology

8.2.1. Thermodynamics of Nano-Structure (2009-01-01 to 2010-12-31)

This research will concentrate on the special thermodynamics theories and formalism at the nano-level, where statistics will play a major role.

The researches will be presented in a paper or a booklet with the following sections:

Part One Overview

Part Two Nano-Thermodynamics

- Thermodynamics of Nano-science & technology
- Thermodynamics of Nano-systems
- Thermodynamics of Nano-Processes
- Thermodynamics of Nanomanufacturing
- Thermodynamics of Nano-engineering
- Thermodynamics of Nano-measurements
- Thermodynamics of Nano-structures
  - Thermodynamics of Nanodots
- Thermodynamics of Nano-phases
- Thermodynamics of Nano-products
- Thermodynamics of Nano-components
- Thermodynamics of Nano-materials
- Thermodynamics of Nano-porous materials
  - THERMODYNAMICS OF NANOCRYSTALS
  - Thermodynamics of Nano-crystalline materials
  - Thermodynamics of Nano-composites
  - Thermodynamics of Nano-particles
  - Thermodynamics of Nano-fibres

- Thermodynamics of Nano-droplets
- Thermodynamics of Nano-canonical constraints
- Thermodynamics of Nano-clays

✧ Thermodynamics of Nano-fluids

Part Three Conclusion and Proposals

8.2.2. Thermodynamics of Nano-Science and Technology (2010-01-01 to 2011-12-31)

Thermodynamics problems and theories for the nano-science and technology – R&D, manufacturing and operation will be exploited, in order to boost the development of nano-products and technology.

8.2.3. Thermodynamics of Small Systems (2012-01-01 to 2013-12-31)

After the researches on nano thermodynamics are completed, it is hoped to extend the studies to the entire branch of the thermodynamics of the small systems as above described.

9. Thermodynamics of cancers

What Thermodynamics has to do with Cancer?

Answering this is my lifetime mission

ALBERT EINSTEIN

A theory is the more impressive the greater the simplicity of its premises is, The more different kinds of things it relates, and more extended is its areas of applicability. Therefore, the deep impression, which classical thermodynamics made upon me. It is the only physical theory of universal content concerning which I am convinced that, within the framework of applicability of its concepts, it will never be overthrown.

OTTO WARBURG

The prime cause of Cancer is the replacement of the respiration of oxygen in normal body cells by a fermentation of sugar.

My research focuses on applying/developing thermodynamic theory to detect and diagnose cancers.

The first step of my researches is to find out thermodynamic properties, which will be unique to cancer cells and thus can be used to monitor cancer development.

My overall mission, however, is to further explore the possibilities of, to track the development of and to find out ways of applying thermodynamics to, the carcinogenesis mechanism and the prevention and detection of cancer

- ✓ by combining thermodynamics and oncology into one,
- ✓ by identifying
  - thermodynamic, (entropy, enthalpy, Gibbs free energy, heat capacity, conductivity, opacity and others)
  - cytological,
  - biological or
  - general physical

  properties or formulations that can be used to judge as criteria of cancerous sign evolution, exactly as the Gibbs energy is the criteria for judging whether a particular chemical reaction may proceed under certain conditions
- ✓ with non-classic thermodynamics (i.e.
  - non-equilibrium,
  - irreversible,
  - definite-time,
  - non-linear thermodynamics as well as,
  - dissipative theory etc)
- ✓ at the specific domains (quantum, molecular, cellular and mesocopic levels)
- ✓ of a particular type of cancer e.g. lung cancer
- ✓ or a particular human organ/tissues
- ✓ under specified conditions (carcinogenetic instances such as smoking etc)

GENERAL IDEA

Non-equilibrium, Irreversible Thermodynamics of Cancer Cell Development
non-equilibrium, irreversible, definite-time , non-linear cellular /molecular / quantum thermodynamics
To find out the basic cause of cancer from the aspect of thermodynamics, thermal physics and other physical and natural sciences together with Medicine and biology.

Attention will be paid to apply the non-equilibrium, irreversible, definite-time and possibly non-linear cellular/molecular/quantum thermodynamics to cancer development, in order to identify thermodynamic theories, ways, properties and criteria in the cancer genesis and later development.

And part of my task is to prove (or reject) the carcinogenesis theory proposed by Dr Otto Warburg and others thermodynamically, mathematically and cytologically.

Normal Cell

chronic illness,
infections,
viruses,
bacteria,
radicals,
stress,
energy deficiency,
oxygen shortage,
pollution,
DNA mutation,
gene mutation and
others

Cancer Cell

GENERAL PURPOSE

To find out how a healthy cell of different parts (organs, tissues etc) is evolved into a cancerous cell under different conditions – chronic illness, infections, viruses, bacteria, radicals, stress, energy deficiency, oxygen shortage, pollution, DNA mutation, gene mutation and others from thermodynamic point of view.

To evaluate existing anti-cancer, cancer prevention, cancer diagnosis and cancer therapy technologies from thermodynamic point of view.

To identify thermodynamics-based new theory, technology, tools, devices, and ways to enable early detection and diagnosis of cancers.

General

My research will focus on thermodynamics of the

- ✧ Carcinogenesis theory
- ✧ prevention
- ✧ diagnosis
- ✧ monitoring
- ✧ treatment and
- ✧ rehabilitation

of cancers.

My research will focus on thermodynamics-> thermophysics -> and physics of the cancers in their phases of
Carcinogenesis (theory)
Cancer prevention
Cancer detection and diagnosis

Cancer treatment (therapy) and
Cancer rehabilitation

Non-equilibrium, Irregular Cellular Thermodynamics of Lung Cancers
Initially attention may be paid to apply the non-equilibrium, irregular cellular thermodynamics to lung cancers, which is among the most fatal cancers in the world, in order to identify thermodynamic and thermophysical theories, ways, technologies, techniques, methods and properties in the above stages of the cancer development and cure.

Integration of The Sporadic Thermodynamic Researches of the Worldwide Carcinogenic Academia
My greatest interest is to integrate the sporadic thermodynamic researches of the worldwide carcinogenic academia into a complete system and to understand the relationships between the cancer cell development and the thermodynamic phenomena in the normal cells. Of particular interests and importance is of course the irreversibility of the cell development and one of the most important task is to identify and quantify the critical point and criteria in determining the moment when the cell will be evolved into a malignant one.
Thermodynamic models will be developed to quantify the cancerous cell development process and relevant thermodynamic properties used for diagnosis of cancer cells with calorimetry and other techniques.

Book Titled "Thermodynamics Of Cancers"
I am intended to write the book titled "Thermodynamics of Cancers" over the next years.

SHORT TERM – 2010-2011
First task is:
to focus on the thermodynamics of the carcinogenetic theory, and on the application of non-static/non-classic thermodynamics (i.e. non-equilibrium, irreversible, definite-time and non-linear thermodynamics, dissipative theory etc) at the specific domains (quantum, molecular, cellular and mesocopic thermodynamics) to the carcinogenic cellular development.

to collect all relevant researches done on the thermodynamic aspects of the cancer theory and as a result of this intensive investigation and review

to write an article or a book titled "Review of Oncological Thermodynamics" or "Review of Thermodynamics of Cancers" or "What is Cancer? – a Thermodynamic Review" with a size of about 600 pages in English, hopefully to be published.

Research Approach:

Main research activities will be concentrated on reading of collected paper, materials and information and thinking, that is, the major part of this period of research is "indoor activities" – i.e. with minimum requirements of insitu observations or experiments.

My main work will be to think thermodynamics and oncology as a whole and to systematize and theorize what others have done or are doing upto now. That is, in my mind, more important than to do my own labwork, which is not my strong point.

And because of the nature of this research, which is more theoretical and philosophical than experimental, my research can “theoretically” be done anywhere. Therefore there shall be no difficulty to “embed” my research activities into your system as well, provided that enough funds and facilities are provided and my freedom of research can be guaranteed. On the other hand, my major facet of the research is the carcinogenesis theory from the thermodynamics point of view. I hope this approach falls in your domain of research. Prevention of second, diagnosis is of third importance and therapy of little priority.

The key of this step of research is reading and thinking.

Lab Works and Collaboration:
Occasionally clinic observations will be done to verify my thoughts;
International symposia and other academic activities will also be attended;
Constant exchange will also be made with the academic circles.
Cost & Personnel:
it involves minimum expenses except my own costs;
No labor tests are foreseen;
Most expenditures will be spent on how to gain access to the large amount of information, data and materials of other researchers, clinic people and facilities.

MEDIUM TERM – 2012-2020
Afterwards I am planning
to integrate the sporadic thermodynamic researches of the worldwide carcinogenic academia into a complete system

to understand the relationships between the cancer cell development and the thermodynamic phenomena in the normal cells and finally

to develop Thermodynamic models which shall identify and quantify the critical point and criteria in determining the moment when the cell will be evolved into a malignant one. Relevant thermodynamic properties used for diagnosis of cancer cells with calorimetry and other techniques will also be applied – such as Entropy, Gibbs energy, Heat capacity and others. Just like in chemical thermodynamics, a thermodynamic property or one integrating a number of others shall be identified to be used as a judgment criteria when the normal cell will be changed into a cancerous one.

Of particular interests and importance is of course the irreversibility of the cancerous cell development.
Book Titled “Thermodynamics of Cancers” will be written to summarize all my researches and studies

LONG TERM – 2021 AND BEYOND
The cancer thermodynamics will be further extended to:
Thermophysics
Fluid dynamics
Heat transfer
Mass transfer
Combustion (chemical reactions)
Radiation

Physics
mechanics
quantum physics
molecular physics
statistic physics
electromagnetics
optics
nano-technology
and others

Chemistry
Biology
and all relevant sciences

In one word, all existing sciences will be employed to study the cancer problems, thus the cancer research will be fully integrated into all sciences.

CURRENT RESEARCH STATUS WORLDWIDE

There are a dozens of universities, independent institutes and laboratories and companies in the world active in these fields. My first impression is that they are more or less concentrating on one particular area or other, but no systematic approach is attempted to develop a complete thermodynamic theory to apply to cancer theory, diagnosis and therapy.
But I still need more time to carefully study what they have done so far, and then I will be able to draw my conclusion.

Current Status

At the present I am only collecting information, arrange them in order, study these information and step by step I am hoping to figure out my own, systematic ideas in order to develop my particular system of theory. There are a dozens of universities in the world active in these fields but I still need more time to carefully study what they have done.

My Research Capacity and Background

Although I am relatively new in this area, particularly I am weak in bioscience, molecular and atomic biology, medicine and medical science, but I realize this will not be a one-man job. Important is, that this man shall have a good picture of the future of this science and I think I am this one.

Also I am a person without Ph.D in science and without books and articles written upto now, but I have written tens of thousands of English reports in various subjects over the last couple of years alone, therefore I think I am able to conduct scientific researches and write scientific reports in the shortest time. I am learning several times faster than most people – while others read in pages, I in books, that is, I complete reading a book in

hours not days. What others need months I need days, etc. Therefore I may catch up with those people who are in this area for decades in a couple of years. In addition I am also proficient in several European languages – English, German, French, Russian, and some Latin, Greek and Hebrew.

10. Thermodynamics & Thermophysics of Life

Draft

10.1. General Plan

1) Carry out special research on some selected topics of thermodynamics. The final decision is to carry out researches on **Thermodynamics & Thermophysics of Life**, details see below.

2) Understand thermodynamic science in its entirety, incl. all its branches. For this purpose a comprehensive list of thermodynamics literature have been prepared available as a first guide to the studies. Thousands of papers and articles in different parts of Thermodynamics have also collected, arranged in the same order as the literature index, so that all future research can be carried out on these bases. And based on this, write the **Thermodynamics Review** books. This will only be realized at time of maturity – that is, when it's ready.

10.2. Thermodynamics & Thermophysics of Life

11. Solar and Cosmic Thermodynamics

This is the first priority of the plan and shall be executed in advance.

No reasoning about this final decision in great details will be given. However, it is based mainly on personal flavor as well as the firm belief that exploration of solar science will eventually benefit the human kind too, and some of the scientific achievements can be readily applied to social and technological progress. When making this decision, no consideration of economic outcome, environment and energy impact as well as food shortage and health problems facing the human race were made.

The solar thermodynamics researches will be split into two parts:

- ✧ Thermodynamics in Solar Technology and Industry and
- ✧ Solar Thermodynamics or Thermodynamics of the Sun

1) Understand thermodynamic science in its entirety, incl. all its branches. For this purpose a comprehensive list of thermodynamics literature have been prepared available as a first guide to the studies. Thousands of papers and articles in different parts of Thermodynamics have also collected, arranged in the same order as the literature index, so that all future research can be carried out on these bases.

2) Carry out special research on some selected topics of thermodynamics. The final decision is to carry out researches on **Solar Thermodynamics and Thermophysics**, and probably later to be extended to **Cosmic Thermodynamics and Thermophysics**, details see below.

3) Write the **Thermodynamics Review** books. This will only be realized at time of maturity – that is, when it's ready.

12. Cosmic Thermodynamics or Thermodynamics of the Universe (2015-01-01 to)

Based on the above (solar thermodynamics and thermophysics), thermodynamics researches shall be extended to the cosmos and planets, because over there, the classic theories are no more working, even the entire classic thermodynamics might be overturned. For example, there might predominate the entropy decrease law in the cosmos, while temperature is in most cases negative, because there are sound proves that there exists large amount of dark or negative energy as well as dark and negative matters in the universe, thus the classic thermodynamics will surely be unable to function. All these problems needs to be studied.

A systematic approach will be adopted in the development of the Thermodynamics of Universe (TOU). From planets to stars to galaxies to star clusters and to the entire universe, from our solar system to other planetary

systems and celestial bodies. Thermodynamics of all types of celestial bodies will be established with unique features of their own. Questions such as how the celestial bodies and even the Universe were created, evolved and run shall be answered, along with various thermal physical and chemical properties

The Thermodynamics of Universe (TOU) will be a complete science branch of the thermodynamics as a whole. It will establish theories, laws and rules governing the thermodynamic activities of the following:

- ✧ The universe as a whole
- ✧ The galaxies
- ✧ The star clusters
- ✧ The stars – black holes, dwarfs, super nova, etc
- ✧ The planets
- ✧ And other celestial bodies

At the moment, only black hole thermodynamics is relatively intensively researched, while some aspects of the solar thermodynamics (as part of solar, celestial physics and astrophysics) are touched. But generally a complete and logic system is still absent.

13. Solar Thermodynamics & Thermophysics

This is the first priority of the plan and shall be executed in advance.

No reasoning about this final decision in great details will be given. However, it is based mainly on personal flavor as well as the firm belief that exploration of solar science will eventually benefit the human kind too, and some of the scientific achievements can be readily applied to social and technological progress. When making this decision, no consideration of economic outcome, environment and energy impact as well as food shortage and health problems facing the human race were made.

The solar thermodynamics & thermophysics researches will be split into two parts:

- ✧ Thermodynamics and Thermophysics of the Sun
- ✧ Thermodynamics and Thermophysics in Solar Radiation, Solar Technology, Industry and Applications

13.1. Thermodynamics & Thermophysiscs of the Sun or Solar Thermodynamics & Thermophysiscs (2015-01-01 to 2011-12-31)

Since 1960's, solar models are well developed, which can fairly correctly explain various sun phenomenon and physical parameters such as temperature, pressure, density, metal abundance, and over the last couple of years, observation, detection, measurement and studies of neutrinos have also proven the solar models.

Nevertheless, neither the solar models nor the solar physics do not touch the solar thermodynamics & thermophysiscs. The solar modelists concern more about the few basic equations of state, while the solar physicists care about the sun activities only, and now even the generation and activities of the solar magnetic fields and the solar corona heating mechanism are not yet rightly described.

Therefore it is necessary to observe and study the thermal physical phenomenon of the solar internal and surface from the thermodynamics & thermophysiscs aspects, incl. its thermodynamic state, thermodynamic functions and relations, and to explain the solar magnetic fields and solar corona heating with thermodynamic theory.

The aim of this studies, as a logic continuation of the previous studies of thermodynamics and thermophysics of the solar corona heating problems and solar wind mechanism, is to establish a comprehensive theory of the solar thermodynamics and thermophysics, in order to explain the major phenomena of sun activities, particularly the energy balance and radiation mechanism.

13.1.1. Thermodynamics and Thermophysics of solar corona heating (2009-01-01 to 2010-12-31)

The mechanism of solar corona heating is still unsolved. Where does the energy come to heat up the solar corona from about 10000 Kelvin at the base upto several millions K at its outer boundary – several sun diameter? Some argue it's due to magnetic force, while other contribute it to seismological movement etc. The aim is to establish physical model to calculate the heating process with different assumptions and try to figure out which is correct. If none is correct, find a assumption. This is of course a challenging task, involving multidisciplinary sciences and lots of solar physics.

The researches will be presented in a paper or a booklet with the following sections:

Part One Solar Corona Physics

- ✧ Geometry
- ✧ Physics – temperature, density, pressure, velocity, magnetism, radiation and others
- ✧ Chemistry

Part Two Review of Solar Corona Heating Models

- ✧ Theories, mechanism and assumptions
- ✧ Data and charts
- ✧ Cons and pros

Part Three Solar Corona Heating Thermodynamics & Thermophysiscs
Application of thermodynamic and thermophysical laws to solar corona heating – the thermal equilibrium, non-equilibrium and non-linear approaches, MHD flow and others

Part Four Conclusion and Proposals

13.1.2. Thermodynamics & Thermophysiscs of solar wind (2013-01-01 to 2014-12-31)

Solar wind extends from solar atmosphere to the heliosphere and it is interacting with earth's magnetospehere as well. Thermodynamics & Thermophysiscs will be established to explore some of the key issues of the creation, movement and properties of the solar plasma.

14. Thermodynamics of the Sun or Solar Thermodynamics

Since 1960's, solar models are well developed, which can fairly correctly explain various sun phenomenon and physical parameters such as temperature, pressure, density, metal abundance, and over the last couple of years, observation, detection, measurement and studies of neutrinos have also proven the solar models.

Nevertheless, neither the solar models nor the solar physics do not touch the solar thermodynamics. The solar modelists concern more about the few basic equations of state, while the solar physicists care about the sun activities only, and now even the generation and activities of the solar magnetic fields and the solar corona heating mechanism are not yet rightly described.

Therefore it is necessary to observe and study the thermal physical phenomenon of the solar internal and surface from the thermodynamics aspects, incl. its thermodynamic state, thermodynamic functions and relations, and to explain the solar magnetic fields and solar corona heating with thermodynamic theory.

The aim of this studies, as a logic continuation of the previous studies of thermodynamics of the solar corona heating problems and solar wind mechanism, is to establish a comprehensive theory of the solar

thermodynamics in order to explain the major phenomena of sun activities, particularly the energy balance and radiation mechanism.

14.1. Solar Thermodynamics (2012-01-01 to 2013-12-31)

After the above research and studies are completed, then the second phase of solar related thermodynamics will be initiated, starting from the Thermodynamics of solar corona heating and Thermodynamics of solar wind.

Thermodynamics of the Sun will begin with the Thermodynamics of solar corona heating and then followed by Thermodynamics of solar wind.
The aim of this purpose is to explain some of the unresolved problems so far such as solar corona heating and solar wind, with the aid of thermodynamics or possibly modify the classical thermodynamics theory to comply with what are happening on the Sun.

14.2. Thermodynamics of solar corona heating (2009-01-01 to 2010-12-31)

The mechanism of solar corona heating is still unsolved. Where does the energy come to heat up the solar corona from about 10000 Kelvin at the base upto several millions K at its outer boundary – several sun diameter? Some argue it's due to magnetic force, while other contribute it to seismological movement etc. The aim is to establish physical model to calculate the heating process with different assumptions and try to figure out which is correct. If none is correct, find a assumption. This is of course a challenging task, involving multidisciplinary sciences and lots of solar physics.

The researches will be presented in a paper or a booklet with the following sections:

Part One Solar Corona Physics
- ✧ Geometry
- ✧ Physics – temperature, density, pressure, velocity, magnetism, radiation and others
- ✧ Chemistry

Part Two Review of Solar Corona Heating Models
- ✧ Theories, mechanism and assumptions
- ✧ Data and charts
- ✧ Cons and pros

Part Three Solar Corona Heating Thermodynamics

14.3. Thermodynamics of solar wind (2010-01-01 to 2011-12-31)

Solar wind extends from solar atmosphere to the heliosphere and it is interacting with earth's magnetospehere as well. Thermodynamics will be established to explore some of the key issues of the creation, movement and properties of the solar plasma.

Since 1960's, solar models are well developed, which can fairly correctly explain various sun phenomenon and physical parameters such as temperature, pressure, density, metal abundance, and over the last couple of years, observation, detection, measurement and studies of neutrinos have also proven the solar models.

Nevertheless, neither the solar models nor the solar physics do not touch the solar thermodynamics. The solar modelists concern more about the few basic equations of state, while the solar physicists care about the sun activities only, and now even the generation and activities of the solar magnetic fields and the solar corona heating mechanism are not yet rightly described.

Therefore it is necessary to observe and study the thermal physical phenomenon of the solar internal and surface from the thermodynamics aspects, incl. its thermodynamic state, thermodynamic functions and relations, and to explain the solar magnetic fields and solar corona heating with thermodynamic theory.

15. Thermodynamics and Thermophysics in Solar Radiation, Solar Technology, Industry and Applications (2015-01-01 to)

Efforts will be concentrating on the investigation and studies of thermodynamics theory involved in all aspects of the solar energy technology and applications, incl.

- ✧ Solar radiation,
- ✧ Solar materials

- ✧ Solar thermal technology
- ✧ Solar phovotoltaic technology
- ✧ Other solar technologies
- ✧ Research and development
- ✧ Manufacturing
- ✧ Operation and maintenance
- ✧ Solar energy use and applications

Purpose of the research is to find out how to optimize the thermodynamic process during the above processes, periods and stages, and to establish a complete system based on the established theories of thermodynamics and thermophysics.

16. Thermodynamics in the solar radiation process and measurement (2008-2009)

Fundamental researches and studies of solar radiation

Solar Radiation Measurement, Solar Physics (Solar Thermophysics and Solar Thermodynamics Researches and Studies and Related Services such as:

- ➢ Fundamental researches and studies of solar radiation, with particular emphasis on solar physics and thermal physics and thermodynamics in the solar radiation process and measurement;
- ➢ Customized researches;
- ➢ Tailored solar measurement services of solar radiation in China;

17. Thermodynamics of Solar Energy Systems (2008 -)

- ✧ Thermodynamics of the sun and related to solar radiation and solar energy use on earth; thermodynamics applications in general;
- ✧ Cryptography and its applications in Internet

17.1. Thermodynamics in Solar Technology and Industry (2009-01-01 to 2011-12-31)

For three years efforts will be concentrating on the investigation and studies of thermodynamics theory involved in all aspects of the solar energy technology and applications, incl.

- ✧ Solar radiation,
- ✧ Solar materials
- ✧ Solar thermal technology
- ✧ Solar phovotoltaic technology
- ✧ Other solar technologies
- ✧ Research and development
- ✧ Manufacturing
- ✧ Operation and maintenance

Purpose of the research is to find out how to optimize the thermodynamic process during the above processes, periods and stages, and to establish a complete system.

Efforts will be concentrating on the investigation and studies of thermodynamics theory involved in all aspects of the solar energy technology and applications, incl.

- ✧ Solar radiation,
- ✧ Solar materials
- ✧ Solar thermal technology
- ✧ Solar phovotoltaic technology
- ✧ Other solar technologies
- ✧ Research and development
- ✧ Manufacturing
- ✧ Operation and maintenance
- ✧ Solar energy use and applications

Purpose of the research is to find out how to optimize the thermodynamic process, and thus to maximize the energy use and minimize the adverse impact on the human being and the environment during the above processes, periods and stages, and to establish a complete system based on the established theories of thermodynamics.

I will start with the thermodynamics of solar power systems simultaneously with the research on solar corona heating thermodynamics.

Research scope will be probably the following

- Thermodynamics in the solar PV plant planning
- Thermodynamics in the solar PV plant designing
- Thermodynamics in the solar PV plant procurement
- Thermodynamics in the solar PV plant engineering
- Thermodynamics in the solar PV plant construction
- Thermodynamics in the solar PV plant commissioning
- Thermodynamics in the solar PV plant operation
- Thermodynamics in the solar PV plant maintenance and repair
- Thermodynamics in the solar PV plant expansion
- Thermodynamics in the solar PV plant decommissioning

18. Thermodynamics Review (2009-01-01 to)

Over the past years, thermodynamics has been progressing in both the scope of depth and width.

In the scope of width, thermodynamics has already come out of the equilibrium arena and has entered and penetrated into the non-equilibrium, irreversible states and into the related and non-relevant disciplines such as pharmaceuticals, biotics, ecosystems, energy, social sciences, economics, and management theory etc.:

- expansion into the cosmos that is the universe system, where gravitational and negative energy as well as dark matters may play vital roles
- extension to the microscopic areas – cellular, molecular, nanoscales, atomic, subatomic areas and their thermodynamic treatment
- penetration and merging with other areas of sciences - natural sciences, arts, incl economics, politics, culture, religion, biology, geology, astronomy, etc
- marching towards the non-classic areas incl
  - non-equilibrium
  - irreversible processes

A preliminary survey shows the thermodynamics has already developed to more than a hundred subbranches. Of course not all of them have become independent disciplines. However special titles and books are already written and published in some branches (refer to ThermoLiterature.doc attached). This list also shows that many of the topics are still not yet covered by the authors.

Therefore it is necessary to understand the current status of the thermodynamics system. Is it necessary to have so many subbranches? Or it is better to maintain a limited number of independent disciplines while the majority appears like the application of the thermodynamic principles to those areas.

Nevertheless, it is necessary to summarize what is achieved in the thermodynamics - its knowledge, theory and experiences, and to present the summarization in form of an encyclopaedia, which shall collect all the thermodynamics as detailed above.

This review will also study the correctness of the categorization of the current thermodynamics system, if necessary make some correction. And its main objective is to provide keynote introductions to the individual branches, its recent status of researches and progress, the main obstacles and problems unsolved, the research and development trends and forecasts, and the key scientists in brief.

This review might not be scheduled for the near term task, it will be rather a continuous effort to follow up the general development of thermodynamics and it will be presented to the audience only when it is mature to hand it out to the thermodynamic communities either as printout or e-media.

The review will possibly contain the following information:

- ✧ Brief of scope, content, major theories, findings and contributions
- ✧ Major progress, latest development
- ✧ Development and research trends
- ✧ Major problems to be solved
- ✧ Major researchers and institutions
- ✧ Literatures
- ✧ Papers
- ✧ Websites

19. Thermodynamics – General (2008-2009)

Why have I chosen Thermodynamics as my research subject?

It is a purely random choice, because whatever I will select as my research subject, I will devote the same energy and with the same determination towards a success or a failure, i.e. whether or not there will be good results or not, does not much depend on the areas I am planning to work on. The only key issue is my determination.

However, choosing Thermodynamics might shorten the time for the preparation for entry into the academic communities, as this is the area where I have known relatively well since my graduate study, when I have pursued a master's degree in Thermophsics, which also included Thermodynamics – the others included heat transfer, fluid flow, combustion and radiation. Thus I can save upto 2 years for further indepth studies, compared to a selection of an untapped area such as biomedicine or nano-manufacturing.

Another consideration is the concern about possible failure that eventually no university, no institute, in one word, no one would admit you into their academic circle so that I have to carry my research "solo". In this case, I have no laboratories to work at for some experiments or observations, I would have little chance to read the books and papers because of the inaccessibility to these resources. Therefore only theoretical studies and strategic thinking can help me overcome the shortcomings aforementioned. At lease during the first years when my researches could not be witnessed by others.

Earlier, I have spent several years to study solar radiation and radiation measurement. This is also a large subject and has been researched intensively. Like thermodynamics, it involves a lot of measurement technologies and therefore at the current stage, I am unable to carry out any practical researches without the delicate instruments. People are launching satellites worth many hundreds millions of dollars to observe the Sun radiation and to measure its rays and other solar events. I can't sit quietly at home in order to get all the measurements done.

Over the last 14 years (1994-2008), I have been following the solar industry, have been involving in the consulting services, and have studied much of the solar technologies such as solar photovoltaics, apart from solar radiation and its measurement.

And ever since 1983, when I have completed my graduate studies, I have been working in the energy and electricity power industries, and solar is one of the energy and electricity sources.

The last factor in choosing Thermodynamics is the belief that it is a science with universal applicability and long lasting effectiveness as Albert Einstein once put it:

A theory is the more impressive the greater the simplicity of its premises is, the more different kinds of things it relates, and more extended is its areas of applicability. Therefore, the deep impression, which classical thermodynamics made upon me. It is the only physical theory of universal content concerning which I am convinced that, within the framework of applicability of its concepts, it will never be overthrown.

My thermodynamic activities include not only researches but also services to the industries.

19.1. Thermodynamic Researches

Planned to study all thermodynamic branches with focus of combustion thermodynamics, solar thermodynamics. Also intended to design a thermodynamics platform and a thermodynamics journal called ThermodynamicsToday.

- 热力学及各分支学科
- **撰写以下著作：**
  - 燃烧热力学 （2008-2010）
  - 太阳热力学 （2008-2010）
  - 热力学大全 （2008-2030）
  - 热力学进展杂志 （2009-）
  - 热力学网络平台 （2009-）

Researches on the thermodynamics of the Sun (from its nuclear fusion core, through the radiation zone, the convection zone, the photosphere, the chromosphere, the transition zone upto the solar corona) have been lasting for quite a while, with initian focus on the solar corona heating problem. Investigating into thermodynamics theories and practices in all solar applications - from upstream solar radiation, to downstream solar power systems) has also been undertaking since long. An overview of the modern thermodynamics is also enrolled into the research interests...

19.1.1. General Plan

a) Understand thermodynamic science in its entirety, incl. all its branches. For this purpose a comprehensive list of thermodynamics literature have been prepared available as a first guide to the studies. Thousands of papers and articles in different parts of Thermodynamics have also collected, arranged in the same order as the literature index, so that all future research can be carried out on these bases.

b) Carry out special research on some selected topics of thermodynamics. The final decision is to carry out researches on Solar Thermodynamics, details see below.

c) Write the Thermodynamics Review books. This will only be realized at time of maturity, that is, when it's ready.

d) Think about the possibility of tackling general concerns and problems challenging the human kinds - poverty, inequality, pollution, health problems, energy and resource crisis and others with thermodynamics

19.1.2. Special Researches - Solar Thermodynamics

This is the first priority of the plan and shall be executed in advance.

No reasoning about this final decision in great details will be given. However, it is based mainly on special flavors as well as the firm belief that exploration of solar science will eventually benefit the human kind too, and

some of the scientific achievements can be readily applied to social and technological progress. When making this decision, no consideration of economic outcome, environment and energy impact as well as food shortage and health problems facing the human race were made.

The solar thermodynamics researches will be split into two parts:

- Thermodynamics in Solar Radiation, Solar Technology, Industry and Applications
- Thermodynamics of the Sun

19.1.3. Thermodynamics in Solar Radiation, Solar Technology, Industry and Applications

Efforts will be concentrating on the investigation and studies of thermodynamics theory involved in all aspects of the solar energy technology and applications, incl.

- Solar radiation,
- Solar materials
- Solar thermal technology
- Solar phovotoltaic technology
- Other solar technologies
- Research and development
- Manufacturing
- Operation and maintenance
- Solar energy use and applications

Purpose of the research is to find out how to optimize the thermodynamic process, and thus to maximize the energy use and minimize the adverse impact on the human being and the environment during the above processes, periods and stages, and to establish a complete system based on the established theories of thermodynamics.

The research will be started with the thermodynamics of solar PV plant simultaneously with the research on solar corona heating thermodynamics. Research scope will be probably the following

- Thermodynamics in the solar PV plant planning
- Thermodynamics in the solar PV plant siting
- Thermodynamics in the solar PV plant designing
- Thermodynamics in the solar PV plant procurement
- Thermodynamics in the solar PV plant engineering
- Thermodynamics in the solar PV plant construction
- Thermodynamics in the solar PV plant commissioning
- Thermodynamics in the solar PV plant operation
- Thermodynamics in the solar PV plant maintenance and repair
- Thermodynamics in the solar PV plant expansion
- Thermodynamics in the solar PV plant decommissioning

19.1.4. Thermodynamics of the Sun

Thermodynamics of the Sun will begin with the Thermodynamics of solar corona heating and then followed by Thermodynamics of solar wind. The aim of this purpose is to explain some of the unresolved problems so far such as solar corona heating and solar wind, with the aid of thermodynamics or possibly modify the classical thermodynamics theory to comply with what are happening on the Sun.

Thermodynamics of solar corona heating

The mechanism of solar corona heating is still unsolved. Where does the energy come to heat up the solar corona from about 10000 Kelvin at the base upto several millions K at its outer boundary several sun diameter? Some argue it's due to magnetic force, while other contribute it to seismological movement etc. The aim is to establish physical model to calculate the heating process with different assumptions and try to figure out which is correct. If none is correct, find a assumption. This is of course a challenging task, involving multidisciplinary sciences and lots of solar physics.

The researches will be presented in a paper or a booklet with the following sections:
Part One Solar Corona Physics

- Geometry
- Physics - temperature, density, pressure, velocity, magnetism, radiation and others
- Chemistry

Part Two Review of Solar Corona Heating Models

- Theories, mechanism and assumptions
- Data and charts
- Cons and pros

Part Three Solar Corona Heating Thermodynamics
Application of thermodynamic laws to solar corona heating - the thermal equilibrium, non-equilibrium and non-linear approaches, MHD flow and others
Part Four Conclusion and Proposals

Thermodynamics of solar wind
Solar wind extends from solar atmosphere to the heliosphere and it is interacting with earth's magnetospehere as well. Thermodynamics will be established to explore some of the key issues of the creation, movement and properties of the solar plasma.

Thermodynamics of the Sun or Solar Thermodynamics
Since 1960's, solar models are well developed, which can fairly correctly explain various sun phenomenon and physical parameters such as temperature, pressure, density, metal abundance, and over the last couple of years, observation, detection, measurement and studies of neutrinos have also proven the solar models.

Nevertheless, neither the solar models nor the solar physics do not touch the solar thermodynamics. The solar modelists concern more about the few basic equations of state, while the solar physicists care about the sun

activities only, and now even the generation and activities of the solar magnetic fields and the solar corona heating mechanism are not yet rightly described.

Therefore it is necessary to observe and study the thermal physical phenomenon of the solar internal and surface from the thermodynamics aspects, incl. its thermodynamic state, thermodynamic functions and relations, and to explain the solar magnetic fields and solar corona heating with thermodynamic theory.

The aim of this studies, as a logic continuation of the previous studies of thermodynamics of the solar corona heating problems and solar wind mechanism, is to establish a comprehensive theory of the solar thermodynamics in order to explain the major phenomena of sun activities, particularly the energy balance and radiation mechanism.

19.1.5. Thermodynamics Review

Over the past years, thermodynamics has been progressing in both the scope of depth and width.
In the scope of width, thermodynamics has already come out of the equilibrium arena and has entered and penetrated into the non-equilibrium, irreversible states and into the related and non-relevant disciplines such as pharmaceuticals, biotics, ecosystems, energy, social sciences, economics, and management theory etc.:

- expansion into the cosmos that is the universe system, where gravitational and negative energy as well as dark matters may play vital roles
- extension to the microscopic areas - cellular, molecular, nanoscales, atomic, subatomic areas and their thermodynamic treatment
- penetration and merging with other areas of sciences - natural sciences, arts, incl economics, politics, culture, religion, biology, geology, astronomy, etc
- marching towards the non-classic areas incl
    - non-equilibrium
    - irreversible processes

A preliminary survey shows the thermodynamics has already developed to more than a hundred subbranches. Of course not all of them have become independent disciplines. However special titles and books are already written and published in some branches (refer to ThermoLiterature.doc attached). This list also shows that many of the topics are still not yet covered by the authors.

Therefore it is necessary to understand the current status of the thermodynamics system. Is it necessary to have so many subbranches? Or it is better to maintain a limited number of independent disciplines while the majority appears like the application of the thermodynamic principles to those areas.

Nevertheless, it is necessary to summarize what is achieved in the thermodynamics - its knowledge, theory and experiences, and to present the summarization in form of an encyclopaedia, which shall collect all the thermodynamics as detailed above.

This review will also study the correctness of the categorization of the current thermodynamics system, if necessary make some correction. And its main objective is to provide keynote introductions to the individual branches, its recent status of researches and progress, the main obstacles and problems unsolved, the

research and development trends and forecasts, and the key scientists in brief.

This review might not be scheduled for the near term task, it will be rather a continuous effort to follow up the general development of thermodynamics and it will be presented to the audience only when it is mature to hand it out to the thermodynamic communities either as printout or e-media.
The review will possibly contain the following information:

- Scope and content brief Latest development
- Development and research trends
- Major researchers and institutions
- Major progress

19.1.6. Thermodynamics and Human Kind

Think about the possibility of tackling general concerns and problems challenging the human kinds - poverty, inequality, pollution, health problems, energy and resource crisis and others - with thermodynamics

19.2. Thermodynamic Services

19.2.1. Thermodynamic analysis and optimization of various systems and processes

Application of thermodynamic and thermophysical theories and technologies to carry out energy effectiveness analysis by evaluating the energy use efficiency and effectiveness, energy quality analysis of the thermal systems and equipments, and other analyses by evaluating other social and management systems and by carrying out exergetic and exegoeconomic (thermoeconomic) analysis of the thermal systems, equipments, and other systems.

Thermoeconomics assesses the cost of consumed resources, money and system irreversibilities in terms of the overall production and operation processes. They help to point out how resources may be used more effectively in order to save them. Money costs express the economic effect of inefficiencies and are used to improve the cost effectiveness of production processes.

These analyses can solve problems related to complex energy systems that could not be solved by using conventional energy analyses. Among other applications thermoeconomics are used for:

- Rational prices assessment of plant products based on physical criteria.
- Optimization of specific process unit variables to minimize the final product costs, i.e. global and local optimization.
- Detection of inefficiencies and calculation of their economic effects in operating plants, i.e. plant operation thermoeconomic diagnosis.
- Evaluation of various design alternatives or operation decisions and profitability maximization.

These assessments and analyses help customers to find out the system weakness and deficiency and propose for the necessary improvement for the customers to decide. Apart from consulting fees, no additional charges are imposed and no extra investments are needed, while energy and fuel saving goals could be achieved at the same level or better.

First focus will be on the entire solar industry, from the downstream silicon manufacturing to the planning, siting, designing, procurement, construction, testing and commissioning, operation and maintenance, repair and overhaul, extention and decommissioning, that's the entire lifetime of a PV power plant or PV/solar thermal power systems of various types.

20. Thermal physics (1986-1989)

Thermophysics with special topic of air pollution control in coal combustion when doing my graduate studies.

21. Solar physics (2007-2008)

Solar physics with special interests in solar model, corona heating and solar wind

22. Solar Radiation (2007-2008)

Solar radiation and its measurement technologies

My current focus is study of solar radiation, particularly the theory and mechanism of absorption, reflection and transmission of sun radiation through the earth atmosphere and the terrestrial measurement of solar radiation. Other areas of studies include sun radiation and human health, particularly the relationship of sun exposure to skin cancer and its prevention.

PAST STUDIES

Chen Minghua

The focus is study of solar radiation, particularly the theory and mechanism of absorption, reflection and transmission of sun radiation through the earth atmosphere and the terrestrial measurement of solar radiation. Other areas of studies include solar terrestrial radiation measurement technology, solar physics (with key researches of solar thermophysics and solar thermodynamics).

My goal is to explore and create the above two new fields of solar sciences - solar thermophysics and solar thermodynamics. Currently there are no dedicated publications. Following topics may be covered in my studies and writing:

Part I: Sun Radiation It is a report and book about the sun radiation with the following chapters: Basic theory, Sunlight direct use and storage, Software, databases, and online business, R&D, Scientists, Products, Organizations, Academic events, Publications, Special focus will be put on space solar photovoltaic theory and technology.

Part II: Solar Physics: Research about the solar physics, incl. basic theory and technologies and tools used for understanding the physical phenomenon of the Sun and the space and atmospheric thermal physics owing to the sun radiation.

Part III: Atmospheric Thermal Physics: thermal physics related to the atmosphere for the understanding of sun radiation

Part IV: Thermal Physics in Solar Photovoltaics: thermal physics in the process of research, development, manufacturing and operation of solar silicons, wafers, cells, modules and systems.

Part V: Sun to Human Life: everything the Sun is related to human society, such as healthcare, science, technology, literature, religion, politics, wars, art, commerce and business, a very extensive topic

For this purpose I have been collecting information pertaining to all areas of the solar sciences and to the Sun. I have a rough timetable for the plan.

Fundamental researches and studies of solar radiation, with particular emphasis on solar physics and thermal physics and thermodynamics in the solar radiation process and measurement;
Customized researches;

Sun Radiation is a report and book about the sun radiation with the following chapters: Basic theory, Sunlight direct use and storage, Software, databases, and online business, R&D, Scientists, Products, Organizations, Academic events, Publications, Special focus will be put on space solar photovoltaic theory and technology. Fundamental theory and practical technologies are described, with an integration of solar radiation mechanism on solid, liquid and gaseous objects.

23. Solar Aviation and Aerospace (2006)

I used to have a plan to write the Solar Aviation and Aerospace (**SAA**) book series that are comprised of the following parts:

Part I: Solar Aircrafts: about solar aircrafts using solar photovoltaic electricity as power to drive the propellers through electric motors in fixed and winged airplanes.

Part II: Solar Airships: about solar airships, aerostats, balloons, blimps etc using solar photovoltaic electricity as power to drive the propellers through electric motors without fixed wings mostly for geostationary purposes.

Part III: Light Ion Propulsion: spacecrafts propelled by ion gases generated by electricity from solar or stellar light photovoltaics.

Part IV: Light Sails: space sailing crafts using the following sources of power: 1) solar or stellar light wind 2) solar or stellar light photonic pressure 3) solar or stellar light magnetic pressure and 4) concentrated beams using solar or stellar light power and others.

Part V: Space Photovoltaics: theory and practices of space photovoltaics and technologies and products.

Other authoring includes:
Space solar cells
Space/cosmic solar power

The plan is temporarily suspended due to financial uncertainty.

24. Solar photovoltaics (2001-2006)

Intensive studies were made during this period for the solar PV theory and technology.

25. German Literature Studies (2007)

There was time when I wanted to devote to German language and literature studies and researches, but I gave the plan up after failure to find a research institute to support my plan, such as Goethe Institute.

26. Other Languages

Studies of Greek, Latin and Hebrew were initiated but somehow stopped. I once have a plan to learn 100 languages thus to become one of those in the world with most language proficiency.