

CURRICULUM VITAE

1. Last Name: BIRIS

2. First Name: ALEXANDRU RADU

3. Date of Birth: 2 June 1949

4. Citizenship: Romanian

5. Marital Status: Married with two children

6. Education:

- **1983-1987, PhD, Physics Faculty, Babes – Bolyai University. Dissertation Title: "Hydrogen Absorption in Magnesium Based Metallic Alloys for Energy Applications"**
- **1972 - 1973, Masters of Science, Physics Faculty, Atomic and Nuclear Physics Department, Babes – Bolyai University**
- **1968 - 1972, Bachelor of Science, Physics Faculty, Babes – Bolyai University**

7. Professional Experience

- **1974-2006 Hydrogen storage materials and applications**

Since 1974 when the National Hydrogen Program was established, I was part of the INCDTIM, Cluj Napoca research group, with the research activity focused on both fundamental science as well as development of applications for metal hydrides.

- Scientifically, there were studied the thermodynamic and kinetic aspects of the hydrogen interaction with metallic alloys and the influence of various substitutions on the behavior of these materials in the view of different applications. In over 31 years of research activity there were studied all major families of hydrogen absorbing alloys with the global compositions: AB, AB₂, AB₅, A₂B. Furthermore, it was developed a new class of alloys, Zr-V-Ti based superstoichiometric Laves types with the global composition AB₃, for which over 50 alloys of various compositions were prepared and studied.
- Several major applications of metal hydrides were developed and studied :
 - Ultra-pure hydrogen tanks with storage capacities of 200 liters and 3m³ NH₃;
 - Tanks for mixed fueling of engines ;
 - Use of metal hydrides for hydrogen isotopic separations ;
 - Metal hydride-based refrigeration installation;
 - Metal hydrides-based water pumps
 - A special attention was given to the utilization of metal hydrides in alkaline Ni-MH rechargeable batteries. Using superstoichiometric Laves Phase alloys were obtained discharge capacities of 368 mAh/g. For the manufacturing of the electrodes, it was utilized a new binder and the methodology is included in a patent Nr.119270 B1, entitled: "Binder for the manufacturing of metal hydride electrodes in the alkaline rechargeable Ni-MH batteries". This methodology was awarded with: **Silver Medal** at the 53th World Exhibition of Inventions, Research, and New Technologies – EUREKA 2004, Bruxelles, Belgium, and **Silver Medal** at the 33th International Exhibition of Inventions, New Products and Technologies, Geneva, 2005.
- **2001-2006 Research on the hydrogen storage in carbon nanostructural materials. It was studied the hydrogen interaction with carbon nanotubes (single and multi wall) and carbon nanofibers)**
- **2001-2006 Synthesis of carbon nanostructural materials:**

The discovery of carbon nanotubes in 1991, had opened the the possibility of hydrogen storage in these new large area materials. Starting with 2001 it was started the research on the growth and synthesis of various carbon nanostructures – nanofibers and sigle and multi wall carbon nanotubes as hydrogen storage mediums.

The research activity started with the design, construction, and optimization of a new installation for the synthesis of carbon nanostructures based on the Catalytic Chemical Vapor Deposition (CCVD). The hydrogen uptake characterization was done in the volumetric hydrogen absorption installation already present in our laboratory.

To further improve the nanotubes synthesis process we developed a new superior technology - Inductive Heating assisted CCVD. This way it was obtained a reduction of the overall synthesis time, and decrease in the energy consumption of three times. It was also demonstrated the possibility of using this technology for the growth of any carbon nanostructural material.

The research efforts in the area of carbon nanostructures synthesis is reflected in a number of National and International Collaborations that include Institutes and Universities known in this research area:

- University of Arkansas at Little Rock (UALR) (USA), Applied Science Department (Dr. M. K. Mazumder si Dr. A. S. Biris) and Chemistry Department
- National Institute of Advanced Industrial Science and Technology, Tsukuba, Japonia, Dr. Y. Soneda – collaboration in the area of Multi Wall carbon nanotubes synthesis.
- National Center for Toxicology Research (NCTR), Food and Drug Administration, USA
- Arkansas Nanotechnology Center, Dr. A. S. Biris, Dr. Zongrui Li – research in the area of carbon nanostructural growth and fabrication of nanocomposite materials.

The main research directions in the area of the carbon nanostructures are focused in three main directions:

- Identification of new catalyst systems for improved quantitative and qualitative growth of carbon nanotubes
- Basic research focused on the elucidation of the carbon Nanotubes growth mechanism
- Novel and advanced applications of Carbon Nanostructural Materials.
- **2004 Visiting Scientist at the Arkansas Nanotechnology Center and University of Arkansas at Little Rock**
- **2006 Visiting Scientist at the Arkansas Nanotechnology Center and University of Arkansas at Little Rock**

During these visits, I worked as a technical advisor in the area of carbon nanotubes synthesis and to further develop the RF – CCVD synthesis process. The result was the development of a long term scientific collaboration in the area of carbon nanostructural materials synthesis between Drs. A. R. Biris and D. Lupu representing INCDTIM and Arkansas Nanotechnology Center and University of Arkansas at Little Rock. During this visit I have given several invited talks at University of Arkansas at Little Rock, National Center for Toxicology Research and University of Arkansas for Medical Sciences.

11. Patent Applications: 3 patents – OSIM

4 U.S. Patent Applications

12. Affiliations and Memberships at Professional Organizations:

- Romanian Organization of Physics
- Hydrogen and Fuel Cells Associations

13. Foreign languages: English, French

14. Papers and Scientific Manuscripts:

- 30 papers in International Journals (peer –reviewed),
- over 30 Scientific Presentations at National and International Conferences and Meetings.

15. Funded National/International Research Projects:

Program/Project	Participation	Time Period
Hydrogen National Program	Participant	1976 - 1984
Finalization of over 15 research projects based on the applications of metal hydrides	Principal Leader, Participant	1976 - 1994
Program “Orizont 2000”, Energy Commission, “Storage of solar energy in Ni-MH batteries to	Principal Leader	1996 - 2000

develop modules of energetic independence in isolated habitats”.		
Program NUCLEU : Isotopic and Molecular Processes: “Nanostructural Molecular Multifunctional Systems”.	Participant	2003 - 2004
Program MENER: “Processes for the storage of Hydrogen Isotopes” (coordinator ICSI R. Valcea)	Participant	2001 - 2004
Program MATNANTECH: “Advanced materials for shielding of electronic packaging” Coordinator ICPE-C.A. Bucharest.	Participant	2003 -2004
Project CERES, Contr. Nr. 4-48/4.11.2004 “Interfacial and surface phenomena during the growth of carbon nanotubes” Coordinator NIRDIMT Cluj Napoca.	Participant	2004 - 2006
Project CERES, Contr. Nr. 4-105-1/5.11.2004 “Influence of the crystallinity level on the hydrogen storage process in intermetallic compounds” Coordinator INFM Bucharest.	Participant	2004 – 2006
Plan Sectorial, Development of integrated platforms for research in the energy domain.	Participant	2004 – 2006
Project CEEEX, Contract Nr. X1C05/2005 “Advanced Materials for the aerospace industry: C-C Composites with carbon nanotubes and layered fiber-metal mezaphase matrices” (Coordinator INCAS Bucharest)	Project Leader	2005-2008
Project CEEEX, “Poli N-Vinyl Carbazol/Carbon nanotubes based nanostructural composites for optoelectronics and rechargeable Li batteries: synthesis, optical, electric, electrochemical characterization and applications with demonstrations” – Coordinator INFM Bucharest	Participant	2005-2008
Project CEEEX, “Research on the generation, purification, storage of hydrogen obtained by biomass gasification” Coordinator ICCPET-OVM Bucharest.	Participant	2005-2008
Project CEEEX, “Nanocrystalline hydrogen storage materials of high functional performance” Coordinator ICPE-CA Bucharest	Project Leader	2006-2008

18. Other Professionally Pertinent Information

- Reviewer for: *Int. J. of Hydrogen Energy* (USA)
- The published work was referenced by over 100 papers and manuscripts.