# A LIFE DEDICATED TO MATERIALS SCIENCE: PROF. MARIA PETRESCU AT HER 80TH ANNIVERSARY

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The Scientific Bulletin of the University Politehnica of Bucharest is just the right place to evoke the personality of PhD prof. Maria Petrescu, full member of the Academy of Technical Sciences in Romania, because she has been the Series-editor for the Chemistry and Materials Science Series of this journal for 25 years (since 1987 till 2012). Since 1997, this national editorial activity was accompanied by the presence of prof. Maria Petrescu in the Advisory Board of the prestigious international journal "Materials Science Forum" edited by Trans.Tech. Publications in Switzerland.

Born in Romania (Șugag, Transilvania) on the 30th of June 1932, she graduated "Domnița Ileana" theoretical college from Sibiu in 1951 and the Faculty of Metallurgy at the Polytechnic Institute of Bucharest in 1956, obtaining the engineer degree with the Merit Diploma (the highest distinction for a graduate engineer at that time). Married in 1955 to prof. Nicolae Petrescu (nowadays a honorary member of the Academy of Technical Sciences in Romania), she was a devoted mother for her family (two children, a grandchild and two great-grandchildren).

Prof. Maria Petrescu begins to prepare her Ph.D. thesis in the field of the kinetic properties of molten alloys in the pre-freezing range under the scientific direction of the prestigious prof. acad.Traian Negrescu and she obtains her PhD degree in 1971, under prof. Ștefan Mantea's guidance, after prof.Traian Negrescu's premature death. The same professors have guided her activity during the first 5 years after graduation as a researcher at the Metallurgical Research Center of the Romanian Academy. In 1961, prof. Maria Petrescu joined the Physical Metallurgy Department (nowadays the Materials Science and Physical Metalurgy Department) at the Polytechnic Institute of Bucharest (nowadays the University Politehnica of Bucharest), where she carried out an uninterrupted teaching activity till her retirement in 1997, and later on, as a consulting professor. She was granted the degree of full professor in 1980 and the quality of doctoral scientific advisor in Materials Science in 1990. Starting with 1975 for 13 years prof. Maria Petrescu was in turn vice-dean and dean of the Faculty of Metallurgy and head of the Physical Metallurgy Department at the University Politehnica of Bucharest. She

has given courses in Physical Metallurgy and in Structural Theory of Metals for the students of the Metallurgy Faculty for 35 years, as well as in Materials Science at the Aeronautical and Space Building Faculty for 18 years, and at the English Stream of the Mechanical Department at the University Politehnica of Bucharest for 17 years. She was invited and has given a course on Nanomaterials at the French-Romanian Master School at the University of Piteşti.

The teaching and research activity of prof. Maria Petrescu is presented in 130 scientific papers published at home or abroad (Spain, Germany, Switzerland, France, United Kingdom, Canada), 18 universitary textbooks, monographs and treatises, 6 technical patents and more than 100 scientific memoirs and communications at national and international conferences (Spain, Italy, Hungary, Finland, United Kingdom, France, Germany, Canada, USA). From this long list we give in the References of this paper a very brief selection of the most prominent books written by prof. Maria Petrescu (in Romanian and English), as well as some of the foreign books (excluding papers) that have cited the acievements of the prof. Maria Petrescu's scientific research. It is also worth to mention that prof. Maria Petrescu benefited of working stages and scientific visits abroad, such as: the Technical Physics Institute of the Hungarian Academy-1960, Budapest; Trondheim University-1980, Norway; National Polytechnic Institute of Grenoble and Mining School of Nancy-1991, France, during which she established scientific contacts with prominent personalities, especially in the field of amorphous and nanocrystalline alloys (T. Rosenquist, R. Ryum. P. Desré, R. Yavari, G. le Caer, J. M. Dubois).

Prof. Maria Petrescu was an innovative spirit open to the amazing achievements during the last 60 years in the new field of Materials Science. In this line prof. Maria Petrescu has succeded to implement these new knowledges in Materials Science in the the Romanian metallurgical high school teaching. Together with prof. N.Geru, she has contributed to the introduction in the curricula of the new course entitled « Structural theory of the properties of metallic materials » that incorporates the alloy theory based on quantum mechanics, the mechanical behavior of metals based on the dislocation theory a.s.o. Her « Physical Metallurgy and Materials Science » treatise [7] comprising 850 pages is still a modern and highly prized textbook in the field, as well as the chapters she wrote in the recent monumetal treatise [10, 11] for which she was the volume editor.

Equally modern were her scientific achievements in various research fields she adressed during half a century of professional life. In her research period at the Metallurgical Research Center of the Romanian Academy during the years 50', she obtained the rare metal indium intended to be used in the synthesis of semiconductor compounds for the first time in Romania. Her extraction and purification procedure was named « the Petrescu procedure » in a comprehensive

monograph on the metallurgy of rare and disperse metals published in Germany [1]. A Russian monograph [2] mentions the discovery by Maria Petrescu et al. of germanium in Romanian mineral coals.

The years 60' were devoted to the modern field of the atomic transport properties in metallic melts. Her viscosity data and especially the intrinsic atomic diffusion coefficients she obtained by radioactive labelling versus temperature and alloy composition have been introduced in international reference books [3, 4] and extensively commented in a prized Japanese monograph [5]. Besides their fundamental value, her reasearches were extended on alloys of practical significance as, for instance, the results on molten eutectic Al-Si alloys, published in the German Federal Republic (*M. Petrescu*,- Zeitschrift für Metallkunde 61 (1) p.14-18 (1970). The importance of this group of researches was recognized by including prof. Maria Petrescu in the Scientific Advisory Commettee of DIMETA-88 International Conference dedicated to Diffusion in Metals and Alloys [6].

In the years 70' prof. Maria Petrescu extended her atomic diffusion research to the practical field of obtaining surface coatings either by solid-gas reactions or by igneous electrotranport. In this field, she obtained interdiffusion coefficients in binary and ternary alloy systems and also succeeded to bring original contributions to the equilibrium phase diagrams, such as the Cu-Zr system. Instead of radioactive labelling she used in these researches the emerging technique of direct emission X-ray spectroscopy coupled to scanning electron microscopy. In this line, she made an early contribution to the ZAF correction that is nowadays commonplace in EDAX analysis, by checking it on a pure $MoSi_2$ compound obtained by igneous eletrolysis. This contribution was recognized by the German researchers in the field (Zeitschrift für Metallkunde, Bd65, H.5, 1974, p.375; Zwischehnbericht,1974/1975, Max Planck Institut GMBA Düsseldorf).

During the 80' and 90' decades, prof. Maria Petrescu adressed a new field of research namely obtaining amorphous and nanocrystalline alloys that represent metastable structures completely unknown before in Materials Science. Her previous thorough studies on atomic diffusion in liquid metals provided her a sound background for obtaining such structures via rapid solidification of metallic melts at cooling rates $\sim 10^{6\,o}$ C/s when the diffusion processes are slowed down or completely suppressed. Her comprehensive monograph on this subject [8] is the first one published in Romania.

The prominent teaching and research activity of prof. Maria Petrescu was recognized by the scientific community in various ways. In 1982, the Ministry of Education granted her the title of « distinguished universitary professor » ; in 2012 the Senate of the University Politehnica of Bucharest granted her the title of « honoured universitary professor » ; in 1999 she was elected as a member of the Academy of Technical Sciences in Romania ; in 2000 she was elected as a

corresponding member of the American-Romanian Academy of Arts and Sciences funded in 1975 in California by the Romanian Nobel prizer prof. George Emil Palade. In the last decade, she was nominated and has participated to the commissions for granting the PhD degree in France at the National Polytechnic Institute of Toulouse, as well as at INSA-Lyon. Her biography was included as an engineering personality in [12], as well as in Who's Who Encyclopediae (the Encyclopedia »Who'who in Romania », 2002, Pegassus Press ; « Who's who International Biographycal Center », 2001 (29th edition), Cambridge-England ; Austrian « Hűbners Who's Who Encyclopedia » since 2005).

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