

## Message from Professor R. Watanabe

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Congratulation on the publication of the special issue of the journal «Powder Metallurgy and Functional Coatings» commemorating the 100<sup>th</sup> Birth Anniversary of Professor G.V. Samsonov. When I started my career in powder metallurgy in 1966 after graduation from metallurgical department of Tohoku University, the name of «Samsonov» had been well known by the powder metallurgists and ceramists in Japan because of his many papers published in the Soviet Powder Metallurgy and Metal Ceramics (English-translation of Poroshkovaya Metallurgia). At that time, the Japanese metallurgical community was moving from German-style approach based on the phase reactions and phase equilibria towards the research style of England and USA which is based on a more atomistic view point. Researches in sintering metal powders rely on the mass transport theory based on the atom diffusion which was proposed and led by G.C. Kuczynski. The sintering of metal powders was my first research topic and naturally I followed the trends. But at the same time in reading the papers of Prof. Samsonov and his school I felt, though vaguely, that his approach is something important for the true solution of the metallurgical problems. In 1987 I proposed, with Dr. Masayuki Niino of National Aeronautical Laboratory (Now JAXA, Japan) and Professor Toshio Hirai of IMR, Tohoku University, the concept of Functionally Graded Materials (FGMs), which was in-

tended to add the stress-relief function to the super-heat resistant materials for the nose cone and the air intake of the space plane which are subjected to the aerodynamic heating during re-entry into the atmosphere. A graded layer between heat-resistant ceramic and metal support is proved to be effective to alleviate the thermal stresses generated during cooling and will give integrity in the material as a whole. Many papers have been published on FGMs and the application field is enlarging, however, their scientific and technical base is still remaining in the rule of composites, and their crystal chemistry and electronic structure are remained unsolved. Including graded thermoelectric and piezoelectric materials, the gradient functions should be reconsidered by Samsonov approach. I, myself, have had no opportunity to meet Prof. Samsonov, but when I was nominated as a full membership of the IISS in 1981, awarded the Kuczynski diploma, and attended the Herzeg-Noví meeting, I could get in contact with people of Samsonov school with empathy. I have known only recently that Prof. G.S. Upadhyaya was a student of Prof. Samsonov, though we meet often at international conferences of powder metallurgy. His son, Dr. Anish Upadhyaya is also known in Japan as an active young powder metallurgist. I enjoy desk work after retirement from Tohoku University in 2004, in reading papers and writing articles on powder metallurgy.