Editorial

THIS SPECIAL issue is the first one of its kind published in the IEEE TRANSACTIONS ON PLASMA SCIENCE. Plasma-based surface modification and treatment is a burgeoning area that has attracted much attention in a wide variety of research and commercial applications in aerospace, biomedical engineering, metallurgy, polymers, semiconductors, and so on. By using the appropriate techniques, surface properties such as wettability, hardness, mechanical properties, biocompatibility, and bioactivity can be selectively enhanced while retaining the favorable bulk attributes of the materials such as strength and inertness. In order to disclose the physics and mechanism in plasma processes, theoretical and numerical simulation is frequently performed to investigate associated processes and phenomena such as glow discharge, plasma sheath, particle charging, ion trajectories, and heating by the energetic ions or particles, as well as interactions between particles and substrates. This rapidly evolving field is a point of focus in many international conferences such as Ion Beam Modification of Materials, Surface Modification of Materials by Ion Beams, and Plasma Surface Engineering, and particularly the biennial Plasma-Based Ion Implantation and Deposition workshop, and the IEEE International Conference on Plasma Science has seen an increasing number of papers in this area as well.

The intent of this special issue is to present new results and developments, as well as novel methods and studies, in this exciting and technologically important area that also has tremendous industrial relevance. The areas covered include theoretical modeling of plasma processes, instrumentation, and a number of important applications such as surface treatment of polymeric materials, diamond-like carbon, alloys, ceramics, and so on. We are very excited about the diversity and high quality of papers submitted to and published in this special issue. We would also like to thank Dr. Steven J. Gitomer for working with us to make this special issue a reality and Sean Gillespie and Margie Rafferty for the administrative support.

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