Special Issue
Adhesion of Submicron Particles on Solid Surfaces

V. Privman (Editor)
SPECIAL ISSUE

Adhesion of Submicron Particles
on Solid Surfaces

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Interactions of submicron colloidal and protein particles with solid surfaces control particle adhesion (or deposition or attachment, these terms are partially synonymous), and their removal (or detachment). A decade ago, this journal published a conference proceeding [1] dedicated to developments in deposition at solid–liquid interfaces. Since then, this field has seen rapid growth and has become widely spread in different disciplines. Researches on and applications of particles at surfaces have been abundant in biology, chemistry, materials science, physics, all the major fields of engineering, and in industry. Experimental work has varied from applied to more basic-oriented while theoretical developments have ranged from detailed calculations aimed at describing specific systems to various more abstract one- and two-dimensional models. The field has also had its share of large-scale numerical simulations.

This special journal issue brings together researchers from different fields. The reader will find that there are substantial variations in notation, results, techniques, and nomenclature, from one field to another. The aim of this collection of articles has been to allow workers in different fields to learn the ideas and emphases, and the level of theoretical and experimental integration, of other fields of research and application of particle surface interactions. The topical coverage is quite broad, with the title defining and focusing the contents for the readers but not limiting the scope of the articles. Thus, related fields of deposition of atom-size particles and of larger than submicron objects are also represented by few papers.

The papers in this issue were expected to contain review, introduction, and reference components, centering on the work of that author or group. However, no comprehensive review was expected. Instead, the authors were asked to provide a sample of their own research work. As compared, for instance, to the recent book [2], this issue contains more focused articles but covers a broader range of topics.

From the editor’s personal perspective, among the most important developments in this field over the last decade has been the convergence of the theoretical work on random sequential adsorption and experimental data analyses of particle deposition. Another important development has been theoretical and experimental work on multilayer deposition. Move from colloidal systems to more emphasis on biological particles has been another notable development. Publication of the book [3] has helped to formalize and systematize earlier and recent developments.

Now to the future challenges. Particle detachment is one, especially its theoretical description, including the description of the primary minimum in the particle–surface interaction potential, or, more realistically, of the appropriate distribution of its values. Many-body particle–particle interaction effects on the dynamics of particles on or near surfaces require both theoretical and experimental investigation. It would be also important to bridge the gap between workers who study adhesion of particles at the surface and those who study deposition as mainly the process of particle transport to the surface.
Acknowledgements

The guest editor wishes to thank all the contributing authors for their work.

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