Indian Statistical Institute (ISI), Kolkata - 700108

Physics & Applied Mathematics Unit (PAMU)

ELECTROKINETIC TRANSPORT OF COLLOIDAL NANO/MICRO-(BIO)PARTICLES

Speaker

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Colloidal nano/micro-(bio)particles carry an electrostatic charge in aqueous media, and this charge is critical in defining their stability, (bio)adhesion properties, or toxicity toward humans and biota. Determination of interfacial electrostatics of these particles is often performed from zeta potential estimation using the electrophoresis theory by Smoluchowski. The latter, however, strictly applies to the ideal case of hard particles defined by a surface charge distribution under the strict conditions of particle impermeability to electrolyte ions and to flow. Herein, we review sound theoretical alternatives for capturing electrokinetic and therewith electrostatic features of soft colloids of practical interest defined by a 3D distribution of their structural charges and by a finite permeability to ions and/or flow (e.g., bacteria, viruses, nanoplastics, (bio)functionalized particles or engineered nanoparticles). Reasons for the inadequacy of commonly adopted hard particle electrophoresis models when applied to soft particulate materials are motivated, and analytical expressions that properly capture their electrophoretic response are comprehensively reviewed.

Everyone is invited to attend

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