Graduate School Event

Thesis Defense: Tribocharging of identical insulators: triboelectric series, triboelectric cycles and surface charges

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Host: Samara Ren

Tribocharging, or contact electrification, is the phenomenon in which two initially neutral materials exchange electric charge through contact and subsequent separation. While it is widely observed in everyday life and crucial to numerous natural processes, even the most basic aspects of tribocharging are still a mystery—what are the charge carriers involved and what drives their exchange? This work spans three separate projects that address different aspects of tribocharging. First, I introduce a novel strategy combining finite-element method (FEM) simulations with Kelvin Probe Force Microscopy (KPFM) to quantitatively extract surface charge density from surface voltage maps. Second, I present a simple theoretical model that allows for the existence of triboelectric cycles, under the assumption that multiple charge carrying species are involved. Third, I present experimental evidence that identical materials can spontaneously evolve into a triboelectric series, driven by contact history. Modeling this behavior enables the replication of experimental results with simulations, and even experimentally forcing the appearance of a pre-designed series by manipulating contact history. Together, the findings from these projects challenge traditional views on tribocharging, provide new tools for probing it, and open up new avenues of research —all with the hopes of bringing us closer to understanding this puzzling phenomenon.

Wednesday, July 16, 2025 11:00am - 12:00pm

Sunstone Bldg / Ground floor / Big Seminar Room A (I23.EG.102)

This invitation is valid as a ticket for the ISTA Shuttle from and to Heiligenstadt Station. Please find a schedule of the ISTA Shuttle on our webpage: https://ista.ac.at/en/campus/how-to-get-here/ The ISTA Shuttle bus is marked ISTA Shuttle (#142) and has the Institute Logo printed on the side.