

Contamination-free manipulation of extraterrestrial dust particles using acoustic tweezer

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Extraterrestrial samples collected during space missions are highly threatened by contamination issues during on-Earth analysis. High-protection-level protocols were developed, however manipulating the sample and the substrate contribution always affect the system. An optimal strategy to minimize contamination is to perform in situ analysis with contactless techniques. Optical and acoustic tweezers represent ideal candidates for contactless manipulation and analysis of nanometer-to-millimeter sized particles. We used a single-axis acoustic levitator to trap and manipulate different cometary analogs and micrometeorite samples. We studied the particle dynamics through digital imaging analysis. Our investigation allowed to retrieve the trap spring constants, that are found in the mN/m range. We also extracted the geometrical features of the trapped particles.