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Surface Physics Approach to Prebiotic Molecular Aggregation on Mineral Substrates: Focusing on the Earliest Stages

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This project explores the controlled deposition of amino acid molecules onto mineral surfaces relevant to the early Earth environment, under ultra-high vacuum conditions. As an initial step, suitable substrate materials were characterized. Reflectance Anisotropy Spectroscopy (RAS) and X-ray Photoemission Spectroscopy (XPS) were employed to investigate layered systems such as $\text{Ge}_2\text{Sb}_2\text{Te}_5$, as well as TiO_2 and GeAs, which serve as substrates of both physical relevance and scientific interest. Complementary experiments were also carried out on chiral molecules in liquid solution using CD-RAS, providing insights into their optical activity. Furthermore, the project included initial developments in on-surface synthesis techniques, laying the groundwork for future studies on molecular aggregation processes and their correlation with temperature.

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