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THE IMPACT OF PREBIOTIC MOLECULES ON INORGANIC SILICA DEPOSITION AND ITS  
SIGNIFICANCE FOR THE IDENTIFICATION OF PUTATIVE BIOMARKERS ON MARS.

**Abstract**

On Earth, amorphous silica digitate nodules are typically found in hot springs teeming with life. It is thus believed that microbiotic factors play a key role in governing the deposition of these structures. The discovery of digitate protrusions on Mars has raised questions regarding the necessity of biogenic factors during the deposition process; if biology is necessary to form digitate nodules, then sinter may be a potential biosignature. This work aims to contribute to a deeper understanding of the role of prebiotically-plausible organic molecules in silica deposits. Applying colloidal physics enables mechanistic correlation between morphological features and physicochemical conditions. Since hot springs are chemically and minerally complex environments that contribute to the heterogenous nucleation of sinter, we focus on one of the key processes that contribute to silica deposition: wet-dry cycling. Using insights from colloidal physics, we identified that organic molecules can modify silica deposition morphology by altering solution conditions e.g. surface tension. By considering the interplay between minerals and organic compounds, the abiotic model for silica precipitation can be expanded in future to encompass more intricate chemical mechanisms, akin to those observed in natural hot pools.