☐ **Talk** ☒ **Poster**

Interplay of Surface Energy and Rheology in Biopolymer Soil Enhancement

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Biopolymers such as xanthan gum (XG) and locust bean gum (LBG) hold great potential as eco-friendly alternative soil binders. In this work, we investigated the impact of XG/LBG mixtures on the unconfined compressive strength (UCS) of sand. The high strength of dry biopolymer/sand arises from the cohesion between solid polymer films and sand particles which supported by work of adhesion calculation and soil mechanics measurement. LBG exhibits much lower sand reinforcement efficacy because polymers unevenly distributed within sand matrix. The formation of a core-shell structure in LBG/sand is an interplay of surface free energy and viscoelastic properties of polymer solutions. This structure is altered when LBG mixed with XG at varying ratios as those physical properties changed due to the complexity of polymer chains association. By probing these factors, we aim to elucidate the role of surface energies and polymer physics in governing the strength of the sand/polymer network, thereby contributing to a more comprehensive understanding polymer-sand interface. The low strength of gels (G' ~10Pa) cannot solely account for the increased UCS of wet sand over 10kPa. Instead, the high strength of biopolymer/sand is more likely derived from the granular particles with biopolymers as solid glue.