

Wednesday, September 19 2018, 4:10-5:00PM, WEB 1230

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### Hydrophobic Surface State of Talc Structures and the Influence of Polysaccharide Adsorption

**Abstract:** Talc is both an important industrial mineral product recovered by flotation, and also in other cases, a gangue mineral of concern in the flotation of certain sulfide ores, such as the PGM ores in South Africa and in the United States. The surface properties change due to the presence of the aluminum impurity in the silica tetrahedral layer of the talc structure. The extent of aluminum substitution in the silica tetrahedral layer was considered, and the surface polarity changes with increased aluminum content. Also, adsorption of polysaccharide corn starch at high purity hydrophobic minerals was found to be due to hydrophobic interaction. The bubble attachment time increased significantly after conditioning in starch solution. Recovery of the powdered samples decreased drastically after starch adsorption in micro-flotation experiments. Tapping mode atomic force microscopy (TMAFM) images reveal unique structures of starch at high purity hydrophobic surfaces. This research study aims to design improved reagents in talc flotation as an industrial mineral product, and for talc depression in the recovery of sulfide mineral concentrates.

Currently, a fourth-year Ph.D. student working with Dr. Jan Miller on the surface chemistry of talc (magnesium silicate). Venkata completed his bachelors in chemical engineering at National Institute of Technology, Calicut, India. Research experiments consist of a high-speed camera air bubble attachment to check the surface state of talc and the influence of polysaccharide adsorption, atomic force microscopy (AFM) to check talc-talc interaction and image adsorbed polysaccharides, and molecular dynamics simulation studies of a water drop and a bubble attachment at the talc surfaces. He has two published papers and one current submission in peer-reviewed journals.