463e Visualizations of Bubble-Contaminant Interactions in Deinking Flotation

Zachery I. Emerson, Gopal A. Krishnagopalan, and Steve R. Duke

The demand for recycled fiber, coupled with the availability of new printing technologies and the prevalence of new contaminant varieties, has brought about an increased need to better understand flotation processes. Successful flotation depends upon a combination of surface chemistry and fluid mechanics, with the central phenomenon being the interactions of solid particles with bubble surfaces.

High-magnification and high-speed visualization techniques are used to study the interactions of contaminant particles with bubble surfaces. This paper will present direct observations of the adsorption of contaminant particles to surfaces of stationary and moving bubbles using video and images (1000 frames per second, micrometer resolution). Results are presented that quantify the effects of particle properties and solution chemistry on the flotation efficiency. The imaging is used to obtain estimates of the bubble-particle contact time, attachment probability, and adhesion strength for stickies particles, toner particles, enzyme-treated toners, and model glass particles for a variety of chemistries.