155b Gas and Oil Retention in Waste Slurries: Role of Particle Interactions

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The Savannah River Site's Defense Waste Processing Facility, which vitrifies high-level radioactive waste slurries, has been experiencing difficulty concentrating, pumping and melting during slurry processing. The cause of the operational problem has been attributed to the rheology of the processed slurries. The role of particle hydrophilicity/hydrophobicity on slurry particle-particle interactions, slurry texture and micro-rheology on gas and oil retention in waste slurries has been analyzed. The particle-particle interactions and the pressure yield threshold have been probed by capillary force balance technique in conjunction with light interferometry. The effect of different modifiers on the slurry particle interactions has been quantified. A novel concept is proposed for modifying the slurry particle interactions to reduce the slurry shear yield stress and gas and oil retention.