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Abstract

Foulant-foulant and foulant-membrane interfacial interactions play an important role in dictating the extent of fouling. In order to understand the impact of the surface energy of particulate foulants on the fouling extent, the direct observation through the membrane (DOTM) technique was used to characterize critical flux and also assess the initial evolution of foulant deposition. Polystyrene and glass with diameters approximating 10 μm were used as foulants because (i) the similar particle diameter eliminated the differences due to particle back-transport, and (ii) the Gibbs free energies (ΔG) of foulant-membrane and foulant-foulant interactions were both negative (i.e., attractive) and both positive (i.e., repulsive) respectively for polystyrene and glass. Results indicate that: (1) because of the attractive and repulsive *foulant-membrane* interactions of the polystyrene and glass, respectively, (i) critical flux was lower for polystyrene than glass, (ii) the phenomenon of a flowing particle layer was observed at a lower cross-flow velocity (CFV) for glass than polystyrene, and (iii) relaxation was more effective for glass than polystyrene; (2)