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Effect of the Surface Charge of Monodisperse Particulate Foulants on Cake Formation

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Highlights

- Studied fouling mechanisms by latex particles of three different surface charges
- Positively charged particles surprisingly gave less fouling than negative ones
- Network model revealed different initial and specific cake resistances
- Monitoring of fouling in real time via OCT revealed different fouling patterns
- Different pore-blocking tendencies and cake morphologies hypothesized

Abstract

In microfiltration and ultrafiltration, particulate foulants are inevitably deposited on the membrane surface, forming a cake whose structure and behavior play crucial roles in the subsequent filterability of the suspensions. This study investigated the impact of fouling by three types of latex particulate foulants, which were of the same size (3 μm) but with different surface charges. Surprisingly, although the positively charged aminated latex was expected to perform the worst in the flux-decline experiments due to attractive electrostatic interaction with the negatively charged membrane, this latex displayed the best performance relative to the two negatively charged latex. To understand these counter-intuitive results, a novel