Sodium oxalate growth on industrial gibbsite with in-situ optical microscopy

Abstract

Of the many organic impurities present in Bayer liquor, sodium oxalate is known to have one of the most detrimental effects on the Bayer process. Because of its limited solubility, it will co-precipitate with gibbsite during precipitation stage which results in many problems. However, the interaction mechanism between gibbsite and sodium oxalate is not well understood. In this study, the growth of sodium oxalate on the basal and prismatic faces of industrial product gibbsite and caustic washed gibbsite under synthetic Bayer conditions was observed using in situ optical microscopy. After a short induction period, oxalate nucleated on the gibbsite crystals. As a result, the formed nuclei develop the acicular morphology. Caustic washing can remove the Bayer organics adsorbed on the surface of industrial gibbsite crystals and make the surface rougher, which can provide more potential sites for oxalate nucleation and growth. The process of oxalate growth on gibbsite crystals has been recorded as videos.