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Mechanisms of secondary nucleation in aluminium hydroxide

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ABSTRACT

Secondary nucleation of aluminium hydroxide particles in the Bayer process for production of alumina is not well understood. Secondary nucleation plays a crucial role in the crystallisation of aluminium hydroxide, significantly influencing crystal size distribution. This review first describes the sources and mechanisms of secondary nucleation. Subsequently, secondary nucleation is described in terms of the metastable zone width, which is closely linked to the nucleation mechanism. Importantly, time induction for investigating the origins of secondary nucleation is also examined. Finally, strategies are explored for leveraging secondary nucleation to regulate the particle size distribution of aluminium hydroxide.

KEY WORDS

Secondary nucleation, Bayer process, crystallisation, aluminium hydroxide, metastable zone, time induction

BIOGRAPHY

Shima Shaikh is pursuing her PhD at Queensland University of Technology in Brisbane, Queensland. Holding a master's degree in Mathematics from Dr Babasaheb Ambedkar Marathwada University, India, her research centres on analysing and modelling the influence of crystallisation on the particle size of the precipitate. With experience in mathematical modelling and data analysis, she aims to blend industry experience with academic research in her career. She has been involved with the Pacific Alumina Value Chain collaboration group since 2023, collaborating with Rio Tinto Australia, the University of Sydney, and Queensland University of Technology..

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