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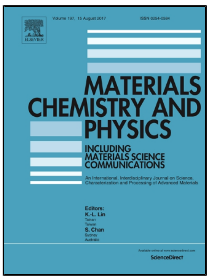

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Near-Room-Temperature Synthesis of Niobate Hydrate Particles with Hexagonal-Platelike Morphologies

Shan Bai[a,b], Jian Zhang[a], Zhuwen Chen[a], Yanding Wang[a], Mei Hong [a,*]and Tomoaki Karaki[b]

[a]Guangdong Provincial Key Laboratory of Nano-Micro Materials Research, School of Chemical Biology & Biotechnology, Peking University Shenzhen Graduate School, Shenzhen 518055, China.

E-mail: hongmei@pkusz.edu.cn

[b]Department of Intelligent Systems Design Engineering, Faculty of Engineering, Toyama Prefectural University, Imizu, Toyama 939-0398, Japan.

Abstract

Platelike alkaline niobates, which are an important class of templates for growing lead-free textured piezoceramic materials, are usually synthesized at temperatures greater than 900 °C from a melting process. We previously developed a hydrothermal route to niobate hydrate at temperatures above 100 °C and combined it with heat treatment to yield platelike niobate perovskite. In this contribution, we present the first report on near-room-temperature wet-chemical preparation of platelike potassium niobate (KN) and potassium sodium niobate (KNN) hydrate particles. Hexagonal-platelike KN-hydrate particles that were 1.5–4.0 μm wide and 0.1–0.35 μm thick were prepared via low temperature synthesis at 60 °C over a period of 24 h in a 9 mol/L KOH solution. Similarly, KNN hydrate particles with a hexagonal-platelike shape were prepared at 40 °C over a period of 48 h in 6 mol/L [OH^-]. Sodium dodecyl benzene sulfonate (SDBS) surfactant was added as a shape modulator. Calcining the KN hydrate particles at 500 °C for 2 h transformed the crystals to a stable perovskite phase while maintaining the platelike