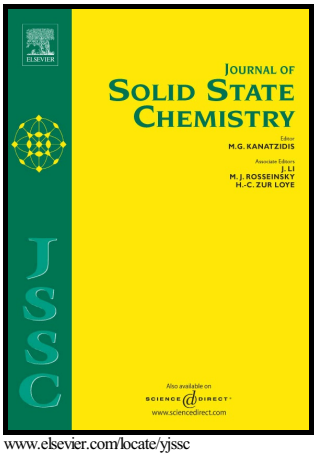
Fe incorporation into hydroxyapatite channels by Fe loading and post-annealing

Sumio Kato, Sho Ikeda, Kanji Saito, Masataka Ogasawara



www.elsevier.com/locate/yjssc

PII: S0022-4596(18)30273-1
DOI: https://doi.org/10.1016/j.jssc.2018.06.032
Reference: YJSSC20279

To appear in: *Journal of Solid State Chemistry*

Received date: 10 April 2018
Revised date: 4 June 2018
Accepted date: 26 June 2018

Cite this article as: Sumio Kato, Sho Ikeda, Kanji Saito and Masataka Ogasawara, Fe incorporation into hydroxyapatite channels by Fe loading and post-annealing, *Journal of Solid State Chemistry,* https://doi.org/10.1016/j.jssc.2018.06.032

Fe incorporation into hydroxyapatite channels by Fe loading and post-annealing

Sumio Kato, Sho Ikeda, Kanji Saito, Masataka Ogasawara

1. Department of Materials Science, Graduate School of Engineering Science, Akita University, 1-1 Tegatagakuen-machi, Akita, 010-8502 Japan

katos@gipc.akita-u.ac.jp

Abstract

Apatite-type solid solutions with the formula $Ca_{10}(PO_4)_6Fe_xO_yH_z$ containing Fe atoms in the channel sites of $Ca_{10}(PO_4)_6(OH)_2$ were successfully synthesized by impregnation with aqueous solution of Fe, followed by heat treatment at 1150 °C in air and cooling to room temperature. The unit cell volume of $Ca_{10}(PO_4)_6Fe_xO_yH_z$ increased with increasing Fe content. The results of structural refinement using powder X-ray diffraction data and Raman spectroscopy suggested that the incorporated Fe ions occupied four-fold sites, away from the center of the channel in the apatite lattice. This method may be useful for synthesizing novel apatite-type functional materials containing transition metals.