脱合金酸化法を用いた Sr 吸着用層状チタン酸塩ナノ材料の開発

（信州大院総理工）〇畑井 浩希・浅尾 直樹

Fabrication of layered titanate nanomaterials for Sr adsorption by dealloying-oxidation method

(*Graduate School of Science and Technology, Shinshu University*) 〇Hiroki Hatai, Naoki Asao

We have reported that alkaline treatment of titanium-aluminum alloys resulted in the formation of titanate nanowires with excellent adsorption performance for strontium ions.[1-2] Furthermore, the thermal stability has been improved by changing the morphologies of nanomaterials from wires to plates by just controlling the concentration of alkaline solutions. In this study, we prepared materials from several alloys ($TiAl_n$, n=1~3) to examine the influence of the ratio on the adsorption ability and found that the $TiAl_2$ worked well as a precursor of titanates with high adsorption property as well as high chemical yield. Moreover, the adsorption results with the granular adsorbents obtained from the above-mentioned titanates under the flow conditions will be discussed.

Keywords : Titanate nanomaterials; Dealloying oxidation; Ion-exchange; Layered compound; Sr adsorption

これまでに我々は、チタン-アルミニウム合金をアルカリ水に浸漬することで、ストロンチウムイオンに対する吸着性能に優れたチタン酸塩の開発に成功するとともに[1-2]、アルカリ条件を変化させることでワイヤーやプレートといったナノ構造の形状制御による耐熱性の向上に成功している。今回我々は、合金のアルミニウム比率を下げることで吸着性能や収量に対する影響について検討したところ、チタンとアルミニウムの比率を１：２まで下げても吸着性能に大きな変化はなく、収量を向上させることに成功した（図 1)。そこで本材料を造粒化して通水条件下における吸着性能について検討を行ったので報告する。

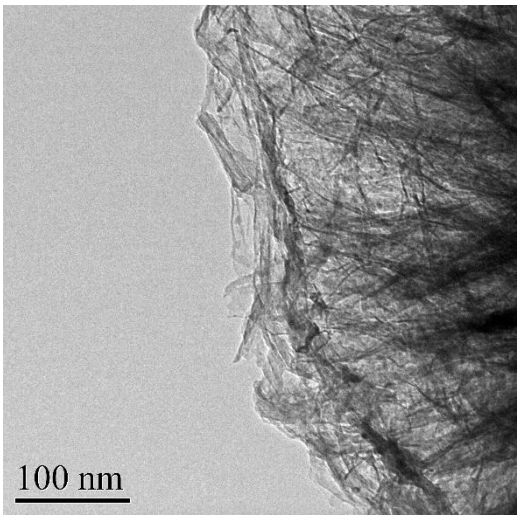

図 1. $TiAl_2$ 由来のチタン酸塩の TEM 像

1) Ultrafine sodium titanate nanowires with extraordinary Sr ion-exchange properties. Y. Ishikawa, S. Tsukimoto, K. S. Nakayama, N. Asao, *Nano Lett.* **2015**, *15*, 2980-2984.

2) Dealloying-oxidation technique as a powerful synthetic tool for sodium titanate nanowires with high ion-exchange ability. T. Saito, M. Zhang, R. D. Kavthe, K. Akagi, K. S. Nakayama, T. Adschiri, N. Asao, *Chem Lett*, **2017**, *46*, 1825-1827.