

Functional Materials Design Using PTFE

Keywords : Mid-temperature reaction, Meta-stable phase

Background

Currently available chemical processes have limitation in producing necessary functional materials. By developing a new synthetic process, design of wider varieties of functional materials becomes possible.

Aim

We have discovered that alkali-metals are selectively extracted when an alkali-metal containing compound is reacted with PTFE (polytetrafluoroethylene). Through the further study of such reactions between PTFE and different kinds of starting compounds, we would like to develop a new synthetic process to design various functional materials.

Advanced Research Topics

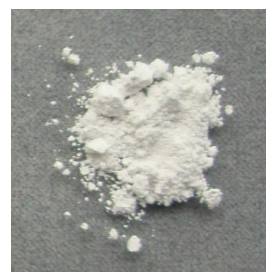
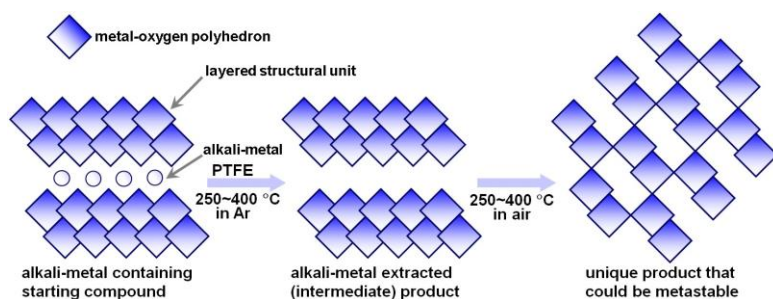


Figure 1. An alkali-metal extracted compound can be produced by heating the mixture of an alkali-metal containing compound and PTFE in inert gas atmosphere or under vacuum. When all the alkali-metals are extracted, crystal structure transformation will take place. In this way, materials that cannot be produced by other synthetic methods can be produced. Such products could be meta-stable ones.

Figure 2. Single-phase brookite-type TiO_2 produced by extracting all the alkali-metals (K, Li) from $_{0.8}\text{Ti}_{1.73}\text{Li}_{0.27}\text{O}_4$ using a reaction with PTFE.

Publications

- Ozawa, T. C.; Sasaki, T. *Inorg. Chem.* **49** (2010) 3044-3050.
- Ozawa, T. C., Sasaki, T. *Dalton Trans.* **43** (2014) 14902-14908.
- Ozawa, T. C., et al. *J. Fluorine Chem.* **168** (2014) 189-192.

Summary

- Alkali-metal extraction process using PTFE has been developed.
- Amount of alkali-metal extraction can be controlled.
- The number of the granted patents: 1

Research outcome

- (Functional) materials that cannot be produced by other methods can be produced.



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