9th International Conference on
Global Warming, Climate Change and Pollution Control
&
Recycling : Reduce, Reuse and Recycle
December 5-6, 2018 | Vancouver, Canada

## Recycling of mine waste sludge to produce multifunctional ceramic

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**Statement of the Problem:** Mine waste sludge is usually generated from a lime neutralization process of acid mine drainage, which formed both at active and abandoned mines. At present, a few investigations on reusability of mine waste sludge have been reported. The environmental and economic problems of sludge disposal at mine sites lead to the need of new technologies for the sludge recycling.

**Methodology:** In this study, we recycled mine waste sludge, which was sampled from two abandoned Japanese mines, to produce multifunctional M-type hexagonal ferrite ceramic by a solid-state reaction with the addition of a small amount of barium carbonate.

**Findings:** The result of X-ray diffraction shows M-type hexagonal ferrite can be obtained when the addition of mine waste sludge is up to 90% (mass%). Impurities in the sludge result in second phases such as crystalline aluminosilicates and amorphous phases in calcined products. An increase in formation temperature of M-type hexagonal ferrite is observed in the case of addition of sludge with higher sulfur content. Furthermore, we think the impurities are responsible for a decrease in melting point, which lead to different microstructure between products from sludge and those from pure chemicals.

**Conclusion & Significance:** The mine waste sludge can be recycled to produce value-added M-type hexagonal ferrite ceramics which have an abroad range of applications. In addition, our study provides a fundamental understanding of how mine waste sludge works in M-type hexagonal ferrites production.

### Biography

Mei Liu is currently a third-year PhD student in Graduate School of Environmental Studies, Tohoku University. She received her MS degree on Environmental Science and Engineering from School of Environment, Tsinghua University in 2006. Then she worked as a teacher in the School of Material Science and Engineering, Jingdezhen Ceramic Institute. She was promoted to a Lecturer in 2008, and Director of Teaching and Research Section of Environmental Engineering in 2013. Her research interests focus on the preparation, characterization, and application of functional materials for environmental pollution control and recycling of solid waste in the production of functional ceramics.

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