conferenceseries.com SciTechnol

Akihiro Yamasaki et al., Expert Opin Environ Biol 2017, 6:4
DOI: 10.4172/2325-9655-C1-017

4th International Conference on
GREEN ENERGY & EXPO
&
6th International Conference on
RECYCLING: REDUCE, REUSE & RECYCLE November 06-08, 2017 | Las Vegas, USA

PAdeCS®, a new type of material derived from concrete sludge and its applications to pollution prevention processes

Akihiro Yamasaki[1], **Takeshi Sasaki**[2], **Hiroyuki Yoshida**[2] and **Atsushi Iizuka**[3]
[1]Seikei University, Japan
[2]Nippon Concrete Co., Ltd., Japan
[3]Tohoku University, Japan

A new type of material PAdeCS®, derived from concrete sludge has been developed and its removal performances for heavy metals and toxic anions such as arsenate, boron were examined. Concrete sludge is waste of fresh concrete, which is rich in calcium and strong alkaline. Concrete sludge is generated when unused concrete is returned from construction sites or excess concrete in the concrete-using industries. In Japan, the annual emission rate of concrete sludge is as large as several millions metric tons and it requires an acid treatment to neutralize the alkaline components before disposal. We have developed a method for manipulating concrete sludge to prepare a solid material through partial removal of calcium contents to avoid hardening of concrete. After solid-liquid separation, the solid residue was obtained, which is still rich in calcium and alkaline. PAdeCS®, so prepared have versatile usage including heavy metal removal and toxic anion removal from waste water. In addition, calcium and alkaline in PAdeCS® would form hydroxyapatite (HAP) when mixed with dissolved phosphorus ions. Thus, PAdeCS® can be used for phosphorous recovery process from sewage stream. We first tested the removal performance of boron and fluorine in water. Since PAdeCS® is derived from hydrated cement, it would contain a certain amount of ettringite, a crystalline material with the chemical formula, $Ca_6Al_2(SO_4)_3(OH)_{12}\bullet 26H_2O$ of which sulfate ions have anion exchange capacity with ambient anions. The experimental results showed that boron as well as fluorine in water can be removed efficiently. In addition, removal of heavy metals and arsenate in water was examined and showed excellent removal performances. Thus PAdeCS® is a versatile solid material for environmental-related applications.

Biography

Akihiro Yamasaki is Professor at the Department of Materials and Life Sciences of Seikei University, Tokyo, Japan. He has his education in Chemical Engineering at the University of Tokyo and awarded PhD in Chemical Engineering for his work on membrane separation. After that, he joined the National Institute of Advanced Industrial Science and Technology (AIST) until he moved to Seikei University. In the meantime, he joined Institute for Environmental Chemistry at the National Research Council, Canada as a Guest Researcher and the Department of Chemical System Engineering at University of Tokyo as a Guest Professor. His research field covers wide range of environmental issues including recycling, CO_2 mitigation, water treatment and air pollution.

akihiro@st.seikei.ac.jp

Notes: