SACI Office of Society Academia Collaboration for Innovation
KYOTO UNIVERSITY

Rare metal recovery and recycling using DualPore™ Technology

We are looking for companies interested in adopting our material.

Background

Rare metals such as palladium are used as catalysts for manufacturing automobiles, semiconductors, and printed circuit boards. These trace metals then remain in solutions and waste liquids and are difficult to recover. The present invention is a new material, DualPore™ Silica, which can efficiently adsorb, separate, and recover trace metals and substances.

Technical Summary

DualPore™ beads are composed of high-purity dual-pore silica particles with high specific surface area due to their bimodal pore structure. The beads consist of microsized through-pores piercing through the silica particles allowing smooth diffusion of solvents into the particles, and nanosized pores, which accelerate the absorption and separation of the molecules (**Fig.1**, Yamada et al. 2018).

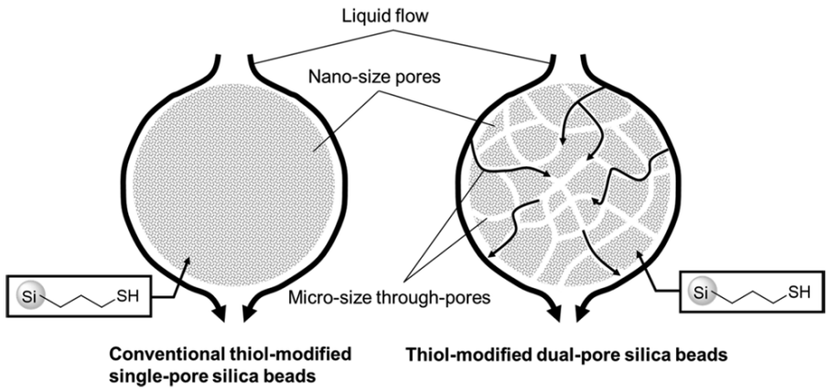

Figure 1. Comparison of the structural characters of conventional single-pore silica and dual-pore silica beads.

➢ Palladium and other rare metals can be recovered and reused

The inventors have conducted field studies on palladium, and have demonstrated that it is possible to recover palladium even from solutions with extremely low concentrations of 0.1 ppm. The recovered palladium can then be sold as concentrated high-grade raw material. In addition, the material demonstrated high performance even at low pressure, therefore eliminating the need for expensive high-pressure equipment.

➢ Faster and cheaper than conventional methods

Conventional metal scavengers require long-term batch adsorption treatment. As a result, the synthesized compounds are denatured, the facility operating rate drops, and it takes time and effort to filter and collect the metal scavenger used. In contrast, the DualPore™ metal scavenger enables simple and efficient adsorption treatment:

- Extremely low filter pressure
- Purification even at <1ppm
- Cost reduction by selectively adsorbing, recovering and recycling only precious metals from the mixture
- Low-cost equipment enables ton-scale mass treatment in a short time (80 times increased speed)

DPS Inc. is a spin-off company from Kyoto University which manufactures and sells DualPore™ products and is looking for business partners.

Development Status

- DualPore™ Technology has been successfully tested for palladium recovery from PCB electroplating tanks.

Applications

- Metal scavenging for recycling and purification
- Separation and purification of organic compounds (proteins/peptides, fatty acids)

Intellectual Property

- Licensing
- Option to license (for feasibility study)
- Other

※Patents Granted

Publication

Yamada T, Matsuo T, Ogawa A, Ichikawa T, Sajiki H. Application of Thiol-Modified Dual-Pore Silica Beads as Practical Scavenger of Leached Palladium Catalyst in C–C Coupling Reaction. *Org Process Res Dev* 2018; **23**. doi:10.1021/acs.oprd.8b00291.

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