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FACULTY OF SCIENCE AND TECHNOLOGY  
DEPARTMENT of  
CIVIL AND ENVIRONMENTAL ENGINEERING

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**" Recrystallization Mechanisms for Heavy Metal  
Stabilization during the Thermal Treatment of  
the Metal-Laden Wastes "**

by

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## Abstract

Metal-laden wastes comprise a wide range of solid wastes including the sludge generated from industrial wastewater treatment processes, the dredged river sediment due to heavy metal contamination, the waste adsorbent after metal adsorption, as well as the tailings after mining activities. The wastes above always contain high levels of hazardous metals, such as nickel, copper, zinc, which may lead to metal bioaccumulation and cause adverse effects for ecosystem. Besides the existence of heavy metals, ceramic raw materials such as aluminium, iron and silicon have also been reported as major constituents in the above waste matrices. Therefore, converting the metal-laden wastes to ceramic products via well-controlled thermal treatment can remove the hazardous metals from the waste stream and enable them to become reusable. The leachability of hazardous metals can be reduced because of the change of mineral phase after thermal treatment. Therefore, we have conducted a series of research on the mechanisms of metal stabilization through ceramic sintering processes. The recrystallization and transportation of the heavy metals were intensively quantified by a combination of the qualitative and quantitative X-ray diffraction (XRD) with the Rietveld refinement. The following achievements can be reached: Firstly, hazardous metals can be well stabilized in the ceramic matrix. Secondly, environmental concerns caused by solid waste accumulation from the increasing amounts of metal-laden wastes will be largely alleviated. Thirdly, a “waste-to-resource” strategy can be proposed through the fabrication of marketable ceramic products by beneficial reuse of the solid wastes.

## Biography

Prof. Yuanyuan Tang is an assistant professor in Southern University of Science and Technology, Shenzhen, China. She got her Ph.D degree from the University of Hong Kong. Her research interests focus on the transformation and stabilization mechanisms of heavy metals, "waste-to-resource" options for biowastes, and the development of ceramic membrane from municipal solid waste. She has published over 30 SCI papers (including Environmental Science & Technology, Water Research, etc.), and authored 3 chapters. She has also obtained funding for over 14 research projects, including NSFC, Peacock Plan Team, etc. She has been invited as speaker, session chair and scientific committee member by many international conferences, and published over 40 conference papers. She was named an Overseas High-Caliber Personnel, Shenzhen, and received many awards, including HKIE Outstanding Paper Award for Young Engineers/ Researchers in 2014, annual teaching awards, and excellent college mentor in 2016.

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