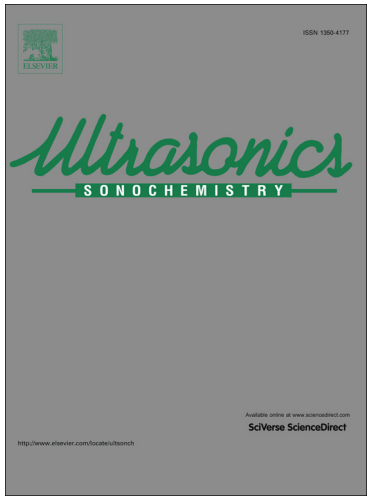

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PII: S1350-4177(17)30305-X
DOI: http://dx.doi.org/10.1016/j.ultsonch.2017.07.008
Reference: ULTSON 3763

To appear in: *Ultrasonics Sonochemistry*

Received Date: 13 April 2017
Revised Date: 5 July 2017
Accepted Date: 5 July 2017

Please cite this article as: V.K. Harika, V.B. Kumar, A. Gedanken, One-Pot Sonochemical Synthesis of Hg–Ag Alloy Microspheres from Liquid Mercury, *Ultrasonics Sonochemistry* (2017), doi: http://dx.doi.org/10.1016/j.ultsonch.2017.07.008

One-Pot Sonochemical Synthesis of Hg–Ag Alloy Microspheres from Liquid Mercury

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Abstract

Metallic mercury has always attracted much attention in various fields because of its unique characteristic of forming amalgams. Here, different phases of pure crystalline Hg–Ag amalgam microspheres are synthesized by ultrasonically reacting liquid mercury with an aqueous solution of silver nitrate. Sonicating different molar ratios of liquid metallic Hg with $AgNO_3$ results in the formation of pure crystalline phases of solid silver amalgams with uniform morphology. The resulting Hg–Ag amalgams from various compositions after sonication are physically characterized by X-ray diffraction (XRD), SEM, Energy dispersive X-ray spectroscopy (EDS) and differential scanning calorimetry (DSC). The XRD of the amalgams obtained from the molar ratios of Hg:Ag (1:1.5) and Hg:Ag (1.5:1 and 2:1) match the Schachnerite and Moschellandbergite phases, respectively, whereas the Hg–Ag amalgam prepared from a 1:1 Hg:Ag molar ratio results in a mixture of the Schachnerite and Moschellandbergite phases. The obtained amalgam microspheres are between 6 and 10 µm in size. The detailed thermal and chemical behaviour of the Ag-Hg systems is also investigated.

Keywords: Hg–Ag microspheres; sonochemical synthesis; amalgams; Schachnerite phase; Moschellandbergite phase

1. Introduction

Mercury (Hg), a unique metallic element in the periodic table, with special potential characteristics, is referred to as a semisolid. Naturally available forms of metallic mercury are