



Synthesis of Iron Yttrium Garnet Nanoparticles by Reverse Microemulsion Method

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Abstract

Colloidal nanodispersion of Iron Yttrium Garnet has been prepared by mixing the two ternary mixture of Triton X-100 (surfactant), n-heptane and aqueous solution that differing only in the aqueous phase. Ethanol was added as cosurfactant and mixed them by ultrasound bath. By mixing these two microemulsions, Iron Yttrium garnet ($Y_3Fe_5O_{12}$) nanodispersion was obtained. Solids were settled by centrifuge, washed and dried, then solids were calcinated at 800 °C, 2 hour, and were characterized them by Scanning Electronic Microscope (SEM).

Keywords. *Iron Yttrium Garnet, Nanoparticles, Reverse Microemulsion.*

Introduction

In recent years, nano-sized materials have attracted great interest due to their unique mechanical, optical, electronic, and magnetic properties [1–5]. The Synthesis of nanoparticles is important due to their superior performance in applications such as electronics, optoelectronics, energy storage and conversion, sensing and drug delivery [6]. It is well demonstrated that the nano-particles modified electrode shows excellent properties in catalysis [7], sensors [8] and fuel cells [9]. Many of approaches have been reported to synthesize nanostructures, such as laser

ablation, chemical vapor deposition (CVD), thermal evaporation, hydrothermal process, chemical reaction, template/precursor-directed methods, and so on [10–17]. Two different kinds of methods have been developed for the preparation of nanocrystals, first method in dry medium is the atmospheric pressure chemical vapor deposition (APCVD) approach, second method in wet routes including various solution-based chemical strategies such as the microemulsion and the sol-gel method.

The microemulsions are divided into four types, namely Winsor I, Winsor II, Winsor III, and Winsor IV systems based on the Winsor

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