

## Facile Synthesis of Copper Nanoparticles in Glycerol at Room Temperature: Formation Mechanism

Huei Ruey Ong,<sup>ab</sup> Md. Maksudur Rahman Khan,<sup>\*a</sup> Ridzuan Ramli,<sup>b</sup> Yonghua Du,<sup>c</sup> Shibo Xi<sup>c</sup> and Rosli Mohd Yunus<sup>a</sup>

<sup>a</sup> Faculty of Chemical & Natural Resources Engineering, Universiti Malaysia Pahang, 26300 Gambang, Malaysia

<sup>b</sup> Malaysian Palm Oil Board (MPOB), No. 6, Persiaran Institusi, Bandar baru bangi, 43000 Kajang, Malaysia

<sup>c</sup> Institute of Chemical and Engineering Sciences (ICES), Agency for Science, Technology and Research, 1 Pesek Road, Jurong Island, Singapore 627833

### ABSTRACT

A copper sol is usually synthesized by the reduction of a copper precursor with a suitable reducing agent in the presence of a stabilizer. There are few reports regarding the preparation of copper nanoparticles in glycerol without using a stabilizing agent, but at elevated temperatures. The formation of reduced copper (Cu<sup>0</sup>) is usually verified by a UV-vis spectrophotometer where a 'red copper sol' was formed. In the present paper we synthesized the copper sol at room temperature in a glycerol medium using hydrazine as a reducing agent. The chemical states of copper in the sol and their composition were analyzed by X-ray absorption near edge structure spectroscopy (XANES) with the linear composition fitting method. A series-parallel mechanism of the reaction was proposed. An average particle size of 5 +/- 1 nm was visualized via transmission electron microscopy (TEM).

**KEYWORDS:** Shake-Down Phenomena; Epitaxial Electrodeposition; Sonochemical Synthesis; Oxide; Reduction; Cu; Particles; Nanowires; Silver; Xanes

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