CONTROLLED SYNTHESIS OF SILVER NANOWIRES AND ITS ASSEMBLY ON COTTON FABRIC

A. Rodríguez Juárez¹, J. Águila López², J. Díaz Reyes², O. Zaca Moran², M. Rodríguez Juárez², and J. F. Sánchez Ramírez².
¹Instituto Politécnico Nacional-UPIITA, Av. Instituto Politécnico Nacional 2580. Barrio Laguna Ticomán, 07340. México D.F.
²Centro de Investigación en Biotecnología Aplicada, Ex-Hacienda San Juan Molino Carretera Estatal Tecuexcomac-Tepetitla Km 1.5, Tlaxcala C.P. 90700, México.
³Instituto Tecnológico Superior de Tlaxco, Predio Cristo Rey Ex Hacienda de Xalostoc s/n Carretera Apizaco Tlaxco Km. 16.8 C.P.90250 Tlaxco Tlaxcala, México.

The synthesis of silver nanowires (Ag NWs) with high quality is challenging because of the low selectivity of the formation of multiply twinned particles at the nucleation stage for subsequent Ag NWs growth. We report a systematic study of the controlled synthesis of Ag NWs with high rate in a simple and scalable preparation method. Using glycerol as a reducing agent and a solvent with a high boiling point, the reaction is rapidly heated to 150 °C in air to synthesize Ag NWs with a very high yield in gram level. The obtained Ag NWs are highly crystalline, monodisperse and exhibit two absorption peaks at 350 and 380 nm. By simply varying the temperature of reaction, the formation of Ag NWs can be controlled. Visual color changes between 40 - 140 °C were observed in the colloidal dispersions. A possible growth mechanism of the Ag NWs is given. The Ag NWs were assembly on cotton fibers through a one-step simple dip and dry process to fabricate superhydrophobic cotton fabrics. The formation and assembly of Ag NWs has been confirmed using the techniques UV-Vis spectroscopy, XRD, SEM and EDS.

Keywords: Synthesis, Nanowires, Cotton fabrics

Presenting author’s email: alexrj3@hotmail.com