Short Communication

Preparation of Large-scale SnO₂:F Transparent Conductive Film by Atmospheric Spray Pyrolysis Deposition and The Effect of Fluorine-doping

Xin Zhao¹, Yun Deng², Jiang Cheng^{2,*}

¹ Civil Aviation Flight University of China, Guanghan 618307;

² Research Institute for New Materials Technology, Chongqing University of Arts and Sciences, Chongqing 402160

*E-mail: caiwu0301@163.com

doi: 10.20964/2016.07.45

Received: 5 April 2016 / Accepted: 7 May 2016 / Published: 4 June 2016

High-quality SnO₂:F films with an area of 15×15 cm² were prepared from stannic chloride (SnCl₄) solution via a house-made ultrasonic spray pyrolysis instrument. The focus of this investigation was on the volatilization of solution and doping process of fluorine, the main influencing factors on F doping content, and the effects of F doping content on the crystal structure, surface morphology, electrical, and optical properties. The results indicated that the crystallinity was enhanced with increasing doping concentration; the films exhibited (101) oriented growth and the resistivity decreased at first and then increased. During the preparation route, the droplet momentum and the temperature field above the hot plate demonstrate the most dominate influence on the film's properties. The spray droplet gradually hydrolyzed during the moving process from sprinkler to substrate while the F doping content decreased with the increasing distance between the sprinkler and the substrate. By controlling the doping of F, high-quality and large area SnO₂:F films with a resistivity of 1.2×10⁻³ Ω·cm and a visible light transmittance of 82% were prepared, demonstrating a promising application for organic solar cells and low emissivity glass.

Keywords: transparent conductive films; low emissivity glass; SnO₂:F; ultrasonic spray pyrolysis

[FULL TEXT](#)

© 2016 The Authors. Published by ESG (www.electrochemsci.org). This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).