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Characteristics of Fluorine-doped tin oxide thin films grown by Streaming process for Electrodeless Electrochemical Deposition GBADEBO YUSUF, Osun State Polytechnic - Iree, FARNOOD KHALILZADEH-REZAIE, Department of Physics, University of Central Florida, Orlando, USA, JUSTIN W. CLEARY, Sensors Directorate, Air Force Research Laboratory, Wright-Patterson Air Force Base, US, ISAIAH O. OLADEJI, SISOM Thin Films LLC, Orlando, USA, KOUKOU SUU, ISET, ULVAC, Susono, Shizuoka, Japan, WINSTON V. SCHOENFELD, CREOL, The College of Optics & Photonics, University of Central Florida, Orlando, USA, ROBERT E. PEALE, Department of Physics, University of Central Florida, Orlando, USA, AYODEJI O. AWODUGBA, Department of Pure and Applied Physics, Ladoke Akintola University of Technology, Ogbomoso, Nigeria — This work investigated the characteristics of SnO_2: F films grown by Streaming Process for Electrodeless Electrochemical Deposition (SPEED). Stannic chloride ($SnCl_4$) and ammonium fluoride (NH_4F) was dissolved in a mixture of deionized water and organic solvents. The preheated substrate temperature was varied between 450 and 530° C. High quality SnO_2: F films were grown at all the substrate temperatures studied. The typical film thickness was 250 nm. XRD shows that the grown films are polycrystalline SnO2 with a tetragonal crystal structure. The average optical transmission of the films was around 93% throughout the wavelength of 400 to 1000 nm. The lowest electrical resistivity achieved was 6 x $10^{-4}\Omega$ cm. The Hall measurements showed that the film is an n-type semiconductor, with the highest carrier mobility of 8.3 cm^2/V.s, and concentration of 1 x 10^{21} cm^{-3}. The direct band gap was determined to be 4 eV from the transmittance spectrum.

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