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Low Cost Corrosion Resistant Water Oxidation Electrodes KELLY LAMBRIGHT, Department of Chemistry and Biochemistry, University of Toledo, CHRISTOPHER ALEXANDER, Department of Chemical Engineering, University of Toledo, DERRICK BARENBRUGGE, DEAN GIOLANDO, Department of Chemistry and Biochemistry, University of Toledo, GIOLANDO RESEARCH GROUP TEAM — Hydrogen gas produced via water splitting has the potential to be an energy source free of emissions. The oxidation half reaction of water splitting has a high energy cost and can be very corrosive towards inexpensive electrode materials and therefore, electrodes consisting of expensive and rare platinum are generally used. This research focuses on both deposition of fluorine doped tin oxide (FTO) as a layer imparting protection against corrosion for inexpensive electrode materials and lowering the overpotential associated with water oxidation using first row transition metal based catalysts. These FTO thin films were deposited onto stainless steel and glass via spray pyrolysis deposition technique employing dibutyltin diacetate or tin tetrachloride with ammonium bifluoride in 200 proof ethanol as the spray solution. Metal salts or metal nanoparticles were added to the spray solution for deposition with the FTO layer. The resultant thin films were characterized using UV-Vis-NIR transmission spectroscopy, two-point probe resistance measurements, scanning electron microscopy, energy dispersive X-ray spectroscopy, and linear sweep voltammetry. The thin film's corrosion resistance was tested via long-term electrolysis studies and coats lasted for as long as 94 days.

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