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Photocatalytic activity of ZnO thin films prepared by DC sputter deposition and thermal oxidation ROBERT LOUDER, CHRISTOPHER MOORE, Coastal Carolina University — Zinc oxide (ZnO) is a wide-bandgap semiconductor with a broad range of applications, such as photocatalysis. The photocatalytic properties of ZnO result from the highly-oxidizing holes and reducing electrons that are induced on the ZnO surface by ultraviolet (UV) light. The efficiency of electron-hole pair formation is therefore critical for photocatalysis, and thus the optical quality of the films in the UV region is of critical importance. ZnO thin films have been fabricated using DC sputter deposition of Zn-metal films followed by thermal oxidation at different temperatures (300, 600, and 900°C). Characterization of the optical properties of the resulting ZnO thin films through photoluminescence indicates that increasing oxidation temperature leads to reduced UV excitonic emission. The photocatalytic activities of the films were also characterized by measuring the efficiency of degradation of Rhodamine B dye in solution. The photocatalytic efficiency of the film annealed at a temperature of 300°C was higher compared to those of the films annealed at temperatures of 600°C and 900°C. The increased photocatalytic efficiency is attributed to the increased optical quality of the films that results from lower oxidation temperatures.

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