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Observed Effects on the Optical Properties of Mg-doped ZnO Thin Films Produced via Electrochemical Deposition[1] JORDAN SPERRY, HONGTAO SHI, ESTHER UNTI, Sonoma State University — Zinc oxide (ZnO) is a semiconductor that has been studied extensively due to its ideal optical properties for applications in optoelectronics. This is due to its relatively large band gap of 3.37 eV and high exciton energy at room temperature. Using high-cost, cutting-edge techniques such as pulsed laser deposition (PLD) and metal organic vapor phase epitaxy (VPE), the band gap of Mg-doped ZnO alloys can be further tuned to as high as 7.8 eV, giving the material even more potential for deep UV applications. Here we report the growth and characterization of Mg-doped ZnO samples onto substrates such as Si, Al, and ITO, using a low-cost, low-temperature electrochemical method in solutions containing zinc nitrate hexahydrate and hexamethylenetetramine (HMT). By tuning various parameters in the growth process, such as the voltage, current density, growth time, and Mg concentration we were able to alter the ratio of Mg incorporated into the samples, and consequently shift the UV emission peak of the alloyed samples.

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