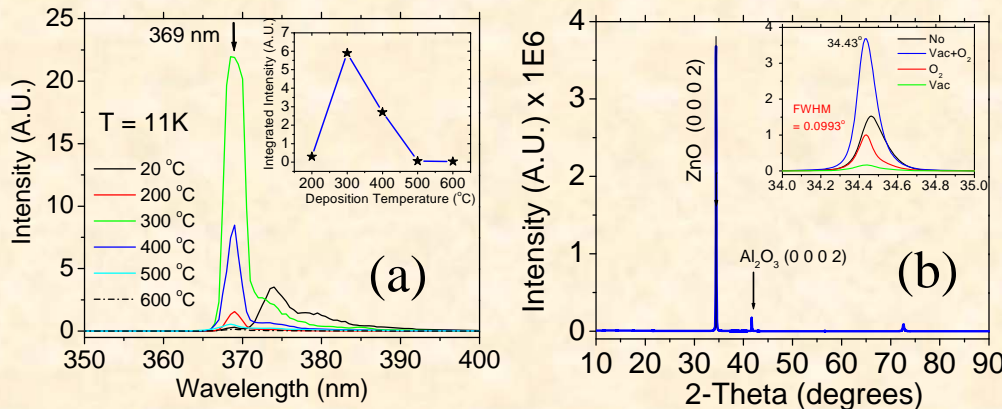




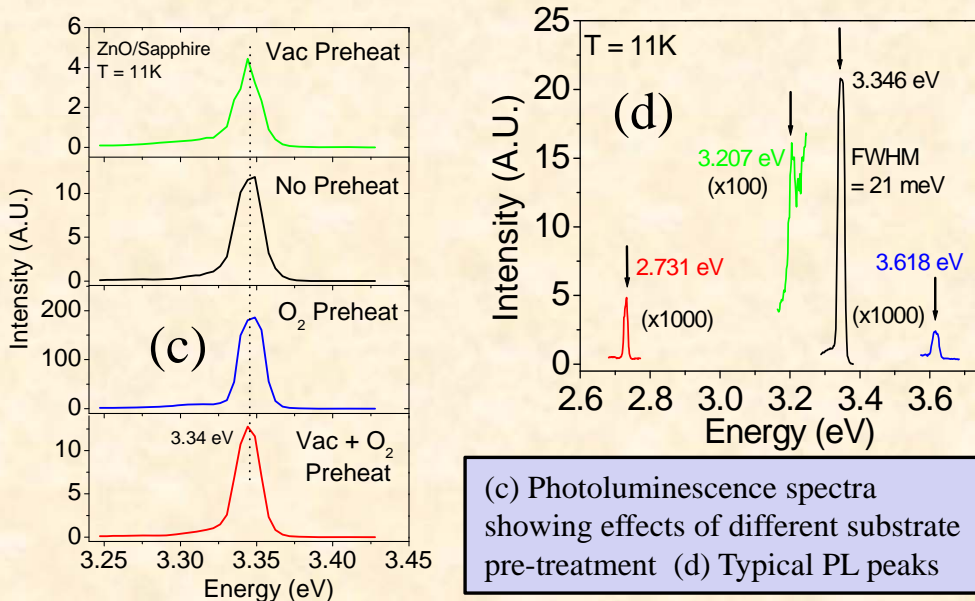
# RUI: Growth and Characterization of Epitaxial ZnO Films for Device Applications: DMR-1006083



**Tom N. Oder:** Dept. of Physics & Astronomy, Youngstown State University, Youngstown, OH



ZnO films deposited on sapphire at different temperatures:  
(a) Photoluminescence spectra (b) XRD 2-theta scans



(c) Photoluminescence spectra showing effects of different substrate pre-treatment (d) Typical PL peaks

**Goal:** Develop p-type ZnO using delta-doping by sputter deposition. Spatial confinement of the p-type doping atoms would result in a 2D doping density profile with a unique V-shaped potential well, which exceeds the solubility limit of homogeneous doping.

**Results:** Optimized film growth by sputter deposition: O<sub>2</sub> preheat (500 °C/30min) substrate temp (300 °C), Deposition gas pressure (20 mTorr, Ar/O<sub>2</sub>), RTP Annealing (900 °C/5min, N<sub>2</sub>).

**Students:** 5 undergraduates, 1 graduate, 1 high school.

**Future Work:** Delta doping with N<sub>2</sub>, As, P atoms.