

Abstract Submitted  
for the NWS08 Meeting of  
The American Physical Society

**Wide band gap  $p$ -type semiconductors  $\text{Cu}_3\text{TaQ}_4$  ( $\text{Q} = \text{S}$  or  $\text{Se}$ )**<sup>1</sup> PAUL NEWHOUSE, PETER HERSH, Oregon State University Department of Chemistry, ANDRIY ZAKUTAYEV, Oregon State University Department of Physics, ANNETTE RICHARD, HEATHER PLATT, DOUGLAS KESZLER, Oregon State University Department of Chemistry, JANET TATE, Oregon State University Department of Physics — The structural and optical properties of thin films, powders, and single crystals of two wide band gap ( $E_g > 2.4$  eV)  $p$ -type semiconducting materials  $\text{Cu}_3\text{TaQ}_4$  ( $\text{Q} = \text{S}, \text{Se}$ ) are presented. These materials exhibit a cubic crystal structure, which is a favorable processing characteristic and unusual among Cu-based wide-gap  $p$ -type materials. Thin films have been prepared using a two-step growth process involving pulsed laser deposition of ceramic  $\text{Cu}_3\text{TaQ}_4$  targets and *ex-situ* annealing of the as-deposited films in a chalcogenide-containing atmosphere. The resultant films exhibit mixed polycrystalline and (100)-oriented structure when grown on amorphous  $\text{SiO}_2$  substrates and show strong (100) preferential orientation when prepared on single-crystal yttria-stabilized zirconia substrates. Powders and thin films of  $\text{Cu}_3\text{TaS}_4$  exhibit intense visible photoemission when irradiated by UV light, and the wavelength of the photoemission can be modulated by doping.

<sup>1</sup>This work is supported by the National Science Foundation under DMR 0245386 and IGERT 0549503

Paul Newhouse  
graduate student

Date submitted: 18 Apr 2008

Electronic form version 1.4