Abstract Submitted
for the FWS16 Meeting of
The American Physical Society

Morphology-Dependent Optical Energy Band Gap in Copper- and Manganese- Phthalocyanine Thin Films.[1] ANH NGUYEN, CARL COSUE, THOMAS GREDIG, California State University, Long Beach — Metallophthalocyanines thin films have been used widely in applications, such as electronic and photonic devices, organic photovoltaic devices, and gas sensors. Copper phthalocyanine (CuPc) and manganese phthalocyanine (MnPc) thin films have been deposited on clean glass substrates by using thermal evaporation at several deposition temperatures to modify the crystal growth. Generally, electrical, and optical properties of CuPc and MnPc thin films depend on the morphology, which includes the grain size distribution (size, shape, and the orientation of stacked molecules), and film surface roughness. The energy band gap is estimated from the optical spectrum of the transmission data and found to vary with deposition temperature. The fundamental energy band gap of MnPc thin films increases for higher deposition temperatures. It has one energy band gap near 3.6 eV, which is in the Q-band region, whereas CuPc thin films have two energy band gaps in both the Soret band region and Q-band region. At low deposition temperatures, CuPc films have gaps at 1.71(2) eV, and 3.05(5) eV. But for higher deposition temperatures, the energy gap decreases to 1.64 eV and 2.93 eV. Consequently, the energy band gap in the Q-band is higher for MnPc than for CuPc.

[1]This research is supported by the Keck Foundation through the Keck Energy Materials Research Program

Anh Nguyen
California State University, Long Beach

Date submitted: 06 Oct 2016 Electronic form version 1.4