Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Enhanced Photoemission in Alq3 Films due to Intermolecular Transitions MILHAN AJWARD, XIAOSHENG WANG, VENKAT GANGILENKA, HANS PETER WAGNER, Department of Physics, University of Cincinnati, OH 45221-0011 — Thin aluminum quinoline (Alq3) organic films are frequently used as an efficient emissive layer in organic light emitting devices. However, the influence of crystalline order on the photoemission due to intermolecular transitions is still rather unexplored. In this work we systematically study the light emission by temperature dependent time-integrated and time-resolved photoluminescence (PL) in Alq3 films that are grown by organic molecular beam deposition. The crystalline order in the films is modified by (1) changing the Alq3 layer thickness, (2) varying the deposition rate, (3) using different substrates and (4) annealing. Depending on these conditions the layers show a more or less pronounced enhancement of the PL at $\sim$170 K which has been attributed to the formation of thermally activated self-trapped excitons. Due to the generation of these localized two-molecule exciton complexes the migration of excitons to non-radiative centers is reduced which leads to an increasing PL efficiency. This interpretation is supported by time-resolved PL measurements.

Milhan Ajward

Date submitted: 19 Nov 2009 Electronic form version 1.4