

Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Molecular shear and the induced massive enhancement of conjugated polymer MEH-PPV photoluminescence by solvent-dewetting CHI-CHING LIU, Dept. of Materials Science and Engineering, National Tsing Hua University, Taiwan, TSANG-LANG LIN, Dept. of Engineering and Systems Science, National Tsing Hua University, Taiwan, GUNTER REITER, Inst. of Physics, University of Freiburg, Germany, ARNOLD C.-M. YANG, Dept. of Materials Science and Engineering, National Tsing Hua University, Taiwan — The molecular flows triggered by dewetting above T_g in ultrathin polymer films were shown previously generating huge photoluminescence (PL) enhancements for conjugated polymers contained within. By means of annealing in solvent vapor at room temperature, MEH-PPV molecules dispersed in inert polystyrene (PS) manifested massive PL enhancements up to ~ 10 folds when flowed into tiny droplets and residual layer. The enhancement was independent of MEH-PPV chain length but, in contrast to thermal dewetting, decreasing with MEH-PPV concentration (c). In addition, the blue shift accompanying thermal dewetting was also reduced. As annealing continued on, the blue shift reversed, illustrating the increase of conjugation length under stretching. The transient blue shift increased with PS molecular weight, unveiling the alteration of inter-segmental chain entanglements up to this stage of dewetting. Surprisingly, vapor of poorer solvent induced larger PL enhancements with narrower transient blue shifts, revealing that solvent was effective in inducing molecular flows, even when in the plasticizing Feakean precursor, relaxing the residual stresses and simultaneously stretching polymer chains for dramatically enhanced optoelectronic efficiencies.

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Date submitted: 27 Nov 2012

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