Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

What determines photoluminescence and quenching when fluorophores in a polymer matrix? HYUNSOOK JANG, University of Connecticut, Institute of Materials Science, YING WANG, YU LEI, University of Connecticut, Chemical, Materials & Biomolecular Engineering, MU-PING NIEH, University of Connecticut, Institute of Materials Science, Chemical, Materials & Biomolecular Engineering — A model system composed of fluorophore (pyrene), dispersed in a polymer matrix (polystyrene, PS) is investigated in order to find the relation between the structure of pyrene assembly in the PS matrix and its fluorescence/quenching. It has been shown that the pyrene disperses differently in the polymer matrix as it is prepared by different processes (namely, electrospin, solution cast and spincoat) with same composition. The difference can result in drastically variation of fluorescence response and quenching efficiency in presence of DNT. Our preliminary data indicate that the salt (tetrabutylammonium hexafluorophosphate, TBAP) applied to electrospinning process plays a crucial role in excimer fluorescence in the emission spectra, while various polymer matrices (e.g., PS and poly-methyl methacrylate, PMMA) yield similar fluorescence without TBAP. X-ray diffraction data suggests that strong dimer fluorescence of the sample may relate to the alignment of pyrene crystal structure, with a lattice length of 8.4 Å. Moreover, a C^{13} solid-state NMR result seems to indicate that the mobility of pyrene in the PS matrix of electrospin system is lower for samples with higher quenching efficiency.

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Date submitted: 19 Nov 2011

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