

Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Special Effect of Polystyrene on Quenching Pyrene in presence of Nitro-Aromatics Explosives DAVID UHRIG, Oak Ridge National Laboratory, HYUN-SOOK JANG, Institute of Materials Science, University of Connecticut, HYUN-SEOK CHO, JOHN W. VAN ZEE, Department of Chemical & Biological Engineering, University of Alabama, MU-PINGH NIEH, Institute of Materials Science, Department of Chemical & Biomolecular Engineering, University of Connecticut — The pyrene (Py) excimer fluorescence and its time-dependent quenching by 2,4-DNT in Py/polystyrene (PS) binary thin films are investigated regarding different architectures (i.e., linear, centipede and 4-arm star) and molecular weights (i.e., 2.5K, 35K, 192K, 350K and 900K) of PS. Both molecular architecture and molecular weight do not show significant effect on either Py excimer fluorescence or its quenching. However, the presence of PS in Py evidently enhances the excimer quenching efficiency under the exposure of nitroaromatic molecules (2,4 dinitrotoluene, DNT). The results of cyclic voltammetry and UV-vis absorption suggest that PS can effectively reduce the lowest unoccupied molecular orbit (LUMO) level of Py/PS than that of Py alone and thus decrease the conduction band with 2,4-DNT —facilitating the photoinduced electron transfer (PET) from Py/PS to 2,4-DNT for fluorescence quenching. This interaction between Py and PS is confirmed by Förster Resonance Energy Transfer (FRET) results in the enhanced $S_0 \rightarrow S_2$ excitation of Py in the range between 300 and 350 nm.

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Date submitted: 14 Nov 2014

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