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Making of Hybrid Network with Syn-Polystyrene and Conducting Polymer

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ABSTRACT: Making a hybrid network composed of polymer-small molecules or polymer-polymer has recently received considerable attention owing to the advantage of getting functional property which is rarely present in pure component. If a polymer – polymer hybrid network is dealing with, few queries should be addressed. (a) are both components mixed homogeneously at elevated temperature (b) do they phase-separate macroscopically upon cooling or do they form an intermingled fibrillary system? (c) Can one polymer chain be trapped into the clathrates formed by the other polymer? Herein, syndiotactic polystyrene (sPS) and poly(3-alkylthiophene) (P3AT) have been judiciously picked up. Among five crystal modifications (α, β, γ, δ and ε) of sPS chains, the δ phase of sPS is very promising as it absorbs guest molecules producing clathrate or intercalates co-crystals, providing the cavities for solvents or other polymers. P3ATs (A = C4-C12) are important conducting polymers and reveal also the fibril-forming property in organic solvents.

Several sPS-P3AT hybrid networks composed of sPS/P3HT (C6) at various ratios and sPS/P3ATs have been attempted to answer these questions. Networks of sPS/P3HT have been systematically characterized by absorption studies (see Figure below), FTIR, atomic force microscopy, small-angle neutron scattering and rheology. Comparative studies will be attempted with other P3ATs.

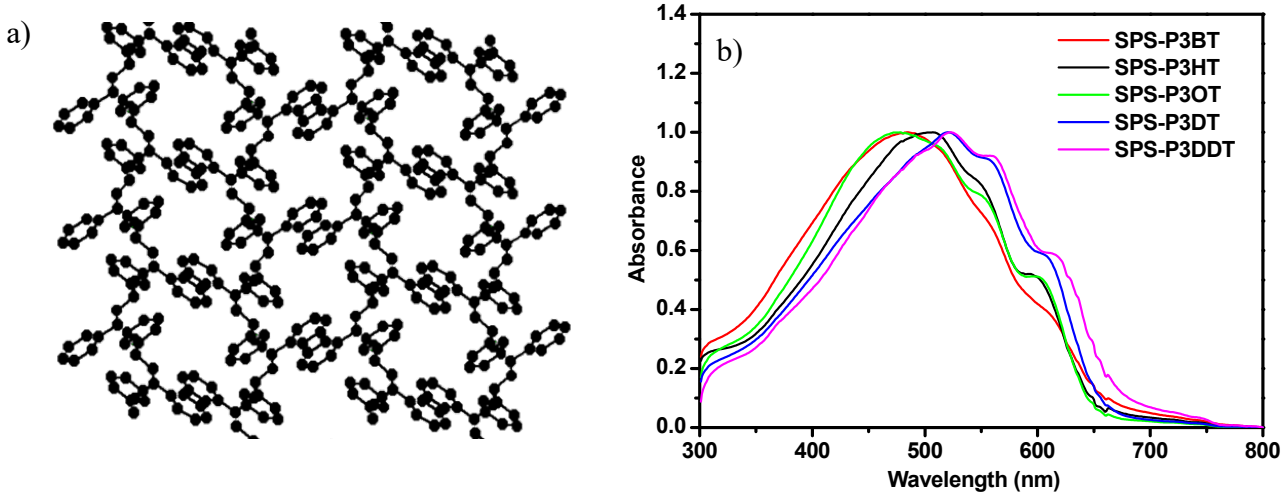

Figure: *a) schematic of sPS chains and b) absorption spectra of sPS-P3AT systems (ranging from butyl to dodecyl alkyl chain).*

KEY WORDS: *syn*-polystyrene, conducting polymers, absorption studies, rheological behaviors

References

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