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Templated growth of PFO-DBT nanorod bundles by spin coating: effect of spin coating rate on the morphological, structural, and optical properties

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Abstract

In this study, the spin coating of template-assisted method is used to synthesize poly[2,7-(9,9-dioctylfluorene)-alt-4,7-bis(thiophen-2-yl)benzo-2,1,3-thiadiazole] (PFO-DBT) nanorod bundles. The
The photoluminescence (PL) spectra of the PFO-DBT nanorod bundles synthesized at different spin coating rates are shown in Figure 7b. The emission of the fluorene segment which normally lied between 400 and 550 nm [2, 5, 6] is not recorded by all of the spectra. It indicates that the fluorene unit has been completely quenched, and an efficient energy transfer from the PFO segments to the DBT units has occurred. The redshift of PL emission of the DBT units (shown by arrow) that are presented by the denser PFO-DBT nanorod bundles well correlated with the redshift of its UV-vis absorption. PFO emission has completely quenched and being dominant by the DBT emission. This phenomenon could be due to the incorporation of the DBT units into the PFO segments which hence leads to the better conjugation length and chain alignment produced by the PFO-DBT nanorod bundles.

Conclusions

In the present study, the effect of different spin coating rates on the morphological, structural, and optical properties of PFO-DBT nanorod bundles is reported. Polymer solution has been demonstrated to have different characteristics and abilities to infiltrate into the cavities at different spin coating rates. Highly dense PFO-DBT nanorod bundles are obtained at low spin coating rate with enhancement of structural and optical properties.

Authors' information

MSF is currently doing his Ph.D. at the University of Malaya. AS and KS are senior lecturers at the Department of Physics, University of Malaya. AS's and KS's research interests include the synthesis of nanostructured materials via template-assisted method and applications in organic electronic devices such as sensors and photovoltaic cells.

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