

# Semiconducting Polymeric Nanoparticles for Use in Improved Photovoltaic Devices

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## **Abstract**

The use of electrically conducting polymers is in the process of revolutionising the electronics industry, but often the devices prepared from these materials are limited by microscale phase segregation of the polymer blends used. The effect of this is a reduction in the possible photocurrent able to be generated. We believe that the lack of control of the mixing of the two conducting polymers in these devices is currently preventing advances in efficiency. The nanoparticle approach offers potentially greater control of layer morphology than current methods of solution casting in organic electronics.

In this project we assess whether well-controlled (i.e. narrow size distribution) conducting polymeric particles in the diameter range 30-130 nm, formed into well-organised monolayers will yield improved electroactivity due to enhanced p-n junction interfacial area.

Currently nanoparticle films of the conducting polymers PFB and F8BT have been characterised and have been used to fabricate 0.1% power conversion efficiency (PCE) organic photovoltaic cells. P3HT and PCBM devices are currently the most efficient (~5 % PCE) and have the promise to be further enhanced with the nanoparticle approach.