

Supramolecular Materials for Inkjet Printing: Self-Assembling Polymer Networks

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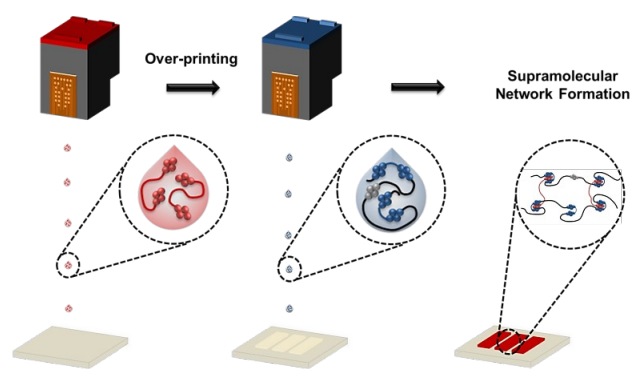
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Electronically complementary, low molecular weight, low viscosity polymers that can self-assemble through tuneable π - π stacking interactions have been developed for inkjet printing applications.¹ To this end, three printing techniques have been used to successfully deposit supramolecular materials, resulting in facile printing of pseudo high molecular weight polymer networks. Sequential overprinting of the complementary components resulted in supramolecular network formation (Scheme 1) through complexation of π -electron rich polyaromatic chain-ends in one polymer with π -electron deficient chain-folding residues in a second polymer.² The complementary π - π stacked polymer blends generated strongly coloured materials as a result of charge-transfer absorption bands in the visible spectrum, potentially negating the need for pigments or dyes in the ink formulation (Figure 1). Piezoelectric printing techniques were employed in a proof-of-concept study to allow characterisation of the materials deposited, whilst a thermal inkjet printer adapted with imaging software enabled *in situ* analysis of the ink-drops, and of their physical properties. Finally, continuous inkjet printing allowed greater volumes of material to be deposited, on a variety of different substrate surfaces, demonstrating the utility and versatility of this novel type of ink for industrial applications.



Scheme 1: Overprinting of a π -electron rich polymer with a π -electron deficient polymer to afford a coloured supramolecular network on the substrate surface

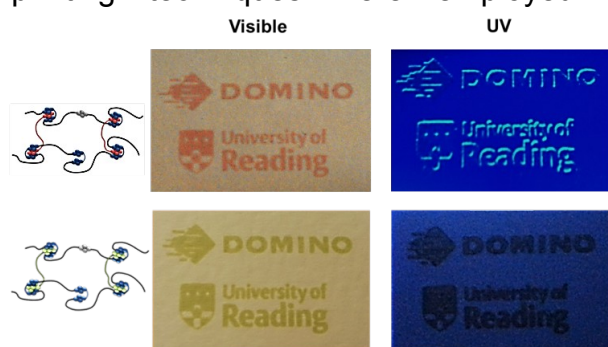


Figure 1: Images of the overprinted pyrenyl (top) and perylenyl (bottom) polymer blends under visible and short wavelength UV light

References

1. L. R. Hart *et al.* Supramolecular materials for Inkjet printing: Self-Assembling Polymer Networks, *submitted for publication*, **2015**.
2. L. R. Hart *et al.*, *Polym. Chem.* **2014**, *5*, 3680–3688.