Printed Electronics Research Collaborative (PERC)

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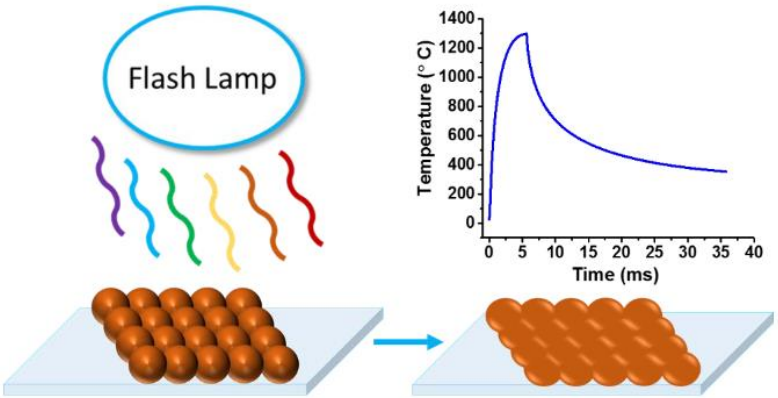
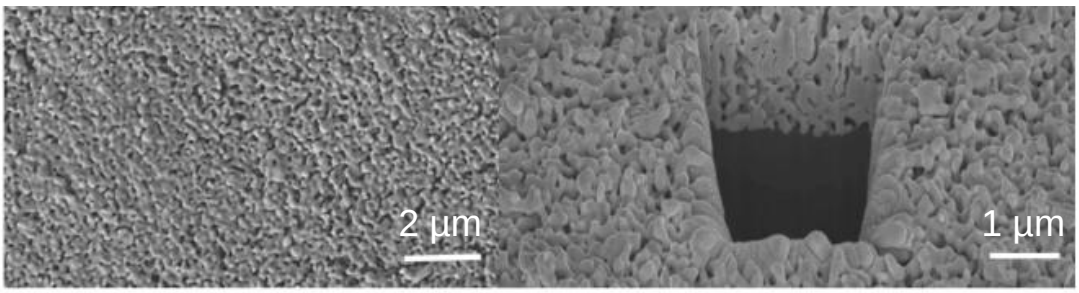
Luce, A., Strack, G., Ranasingha, O., Kingsely, E., Armiento, C., & Akyurtlu, A. (2020). Photonic curing of copper ink films on liquid crystal polymer substrate. *MRS Advances*, **5(42)**, 2191-2199.



Copper nanoparticle (CuNP) based ink (NovaCentrix Metalon® CI-006) printed on liquid crystal polymer (LCP) substrate (Ultralam® 3850 HT) using an aerosol jet printer (Optomec AJ200)

Curing was done with a PulseForge 1300



Copper is an attractive and commonly-used material for metallization in traditional electronics, but for printing processes "copper nanoparticle (CuNP) inks tend to oxidize in ambient temperature if not properly stabilized. Moreover, even if the CuNPs are successfully suspended and stabilized to prevent aggregation and oxidation, high temperature conditions during the curing step can result in oxidation, which decreases conductivity and limits the applications of the material."

Photonic curing "applies pulses of broadband light (200 to 1500 nm) supplied by a xenon lamp... (and is a) scalable technique (which) enables curing on low temperature substrates and decreases the amount of time required to cure a thin film, while minimizing damage to the substrate."

The SEM and tilted FIB-SEM images above show that the curing has fused the CuNPs throughout the film thickness, down to the LCP substrate.