hexylamine), Octyl2 is bis(octylamine) copper (II) formate and Octyl3a is tris(octylamine) copper (II) formate.

Fig. 4 shows data for electrical and mechanical properties of conductive traces made from various other embodiments of silver-based molecular inks. The nominal linewidth is the actual width of the feature in the screen used to print the traces. Δ is defined as the difference between the nominal and the measured line widths.

Fig. 5 illustrates line resolution of molecular ink (NRC-7) printed as an interdigitated feature with trace linewidth of 2.4 mil separated from the next feature by 2.4 mil on Kapton™ (A), the optical profilometer image of the feature (B) and the profilometer analysis of the feature showing the trace linewidth (peaks) and the space between the features (valley) (C). The grey bar graph in the background of (C) is reflectivity data. Where the reflectivity data is less intense the instrument is analyzing Kapton™ substrate, where the reflectivity intensity is high the profilometer is measuring the silver trace.

Fig. 6 depicts a digital image of a conductive trace analyzed with the profilometer (A), the corresponding data acquired from the image (B), and the resulting surface roughness analysis (C) of the trace for the two (P1 and P2) highlighted sections from (B). The conductive trace was printed with molecular ink NRC-7 (E14).

Fig. 7 shows data comparing the properties of molecular silver ink (NRC-2, E11) with that of a commercially available ink (Henkel 725A). Note that properties highlighted in grey do not match the performance of NRC-2.

Fig. 8 shows data for photonic sintered NRC-7 on Kapton™ at 2.4K V and a pulse width of 1500 ms. The prints were not dried prior to photonic sintering.

Fig. 9 shows data for photonic sintered NRC-16 on Melinex™ at 2.6 KV and a pulse width of 1000 ms. The prints were dried for 15 minutes prior to photonic sintering. Thicknesses of the traces could not be directly measured due to distortion of the substrate near the edges of the traces. The thicknesses are based on measurements of comparable traces printed on Kapton™.

Fig. 10 illustrates line resolution of conductive traces made from silver-based molecular inks NRC-15 (E17).

Detailed Description

The molecular ink is flake-less, not making use of metallic flakes to provide conductivity. Instead, the molecular ink comprises a metal precursor molecule, specifically a metal carboxylate, more specifically a C_8-C_{12} silver carboxylate or bis(2-ethyl-1-hexylamine) copper (II) formate, bis(octylamine) copper (II) formate or