Title (en)

MICROMETRIC DIRECT-WRITE METHODS FOR PATTERNING CONDUCTIVE MATERIAL AND APPLICATIONS TO FLAT PANEL DISPLAY REPAIR

Title (de)

MIKROMETRISCHE DIREKTSCHREIBVERFAHREN ZUR MUSTERBILDUNG VON LEITENDEM MATERIAL UND ANWENDUNGEN FÜR DIE REPARATUR VON FLACHEN ANZEIGEPANEELEN

Title (fr)

PROCEDES D'ECRITURE MICROMETRIQUE DIRECTE UTILES POUR STRUCTURER UN MATERIAU CONDUCTEUR, APPLICATIONS POUR LA REPARATION DES ECRANS PLATS

Publication

EP 1726193 A2 20061129 (EN)

Application

EP 05723747 A 20050225

Priority

- US 2005006009 W 20050225
- US 54709104 P 20040225

Abstract (en)

[origin: WO2005084092A2] A new, low temperature method for directly writing conductive metal traces with micron and sub-micron sized features. In this method, a flat beam is used, such as an AFM cantilever, with or without a tip, to draw traces of metal precursor ink onto a substrate. The dimensions of the metal traces can be directly controlled by the geometry of the cantilever, so that one can controllably deposit traces from 1 micron to over 100 microns wide with microfabricated cantilevers. Cantilevers with sharp tips can be used to further shrink the minimum features sizes to sub-micron scale. The height of the features can be increased by building layers of similar or different material. To obtain highly conductive and robust patterns with this deposition method, two general ink formulation strategies were designed. The key component of both ink systems is nanoparticles with diameters less than 100 nm. Because nanoparticles typically have significantly lower melting points than the bulk material, one can fuse, sinter, or coalesce collections of discrete particles into continuous (poly)crystalline films at very low temperatures (less than about 300 °C, and as low as about 120 °C). In the first strategy, one can disperse hydrocarbon-capped nanoparticles in a suitable solvent, deposit them on a surface in the form of a pattern, and then anneal the film by heating to form continuous metallic patterns. In the second strategy, one can deliver metal compounds to the surface in the presence of a reducing matrix and then form nanoparticles in situ by heating that subsequently coalesce to form continuous metallic patterns. In studies with platinum and gold inks, both nanoparticle-based methods yield micron sized traces on glass and oxidized silicon that have low resistivity (4 microohm.cm), and excellent adhesion properties.

IPC 8 full level

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CPC (source: EP KR)

C09D 11/02 (2013.01 - EP KR); **C09D 11/30** (2013.01 - EP KR); **C23C 18/08** (2013.01 - EP KR); **C23C 18/161** (2013.01 - EP KR); **G02F 1/1362** (2013.01 - EP KR); **H05K 3/1241** (2013.01 - EP KR); H05K 2203/0195 (2013.01 - EP KR)

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