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Deposition copper conductors on glass-ceramics surfaces, by laser induced method

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Laser-induced chemical liquid phase deposition (LCLD) used for metal deposition from solutions onto surfaces of dielectrics [1,2] is based on the local impact of laser beam focused at the interface of a solution and a dielectric surface. This results in the initiation of metal reduction within the focal zone of laser beam yielding metal structures of a micrometer range at the interface of the solution and the surface. The reaction of copper deposition has the following form:

$$CuL^{(n-2)-} + 2HCHO + 4OH^- \rightarrow Cu^0 + L^{n-} + H_2 + 2HCOO^- + 2H_2O$$

Copper was deposited onto dielectric substrates made from glass ceramic "Sitall CT-50-1" widely employed in microelectronics.

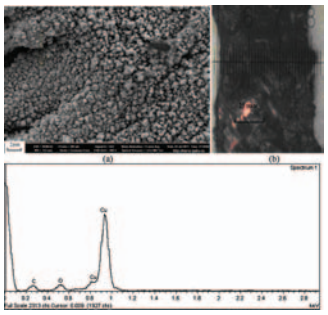

Image: SEM (a) and optical (b) microphotographs of the copper sediment made from the solution with sorbitol as reducer (the scale rate is given in the figure). (c) Presents the copper sediment EDX-spectrum.

The experiments for copper deposition at different laser powers were performed. The scanning speed of laser beam was 0.01-01mm/s, DPSS laser (532nm). The dependence of copper lines width on laser power was clarified for each dielectric material. Copper lines were analyzed by optical reflectance microscopy and scanning electron microscopy.

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