Accepted Manuscript

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PII: S1359-8368(18)32121-8

DOI: 10.1016/j.compositesb.2018.08.030

Reference: JCOMB 5860

To appear in: *Composites Part B*

Received Date: 6 July 2018

Accepted Date: 7 August 2018

Please cite this article as: Wang Y, Xu Y-h, Cao Z-y, Yan C, Wang K, Chen J-j, Yan C, Feng Z-s, A facile process to manufacture high performance copper layer on ceramic material via biomimetic modification and electroless plating, *Composites Part B* (2018), doi: 10.1016/j.compositesb.2018.08.030.

A facile process to manufacture high performance copper layer on ceramic material via biomimetic modification and electroless plating

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Abstract:

A convenient and eco-friendly approach to fabricate high-quality copper layer on ceramic viasurface modification combined with electroless plating is introduced in thispaper. Through the surface modification of polydopamine,alumina ceramic substrate is capable ofadsorbing silver ions, which could create an activating layer to catalyze the subsequent electrolesscopper plating (ECP) at low temperature. The finding that modificationcould obviously enhance the adhesion betweensubstrates and copper layers are evaluated by water contact angle measurement, XPS, FT-IR, SEM, EDS andadhesion tests. Moreover, after30 min of ECP, the resulting deposited copper layer presents an excellent performance in adhesion (highest level in ASTM D3359) andconduction (up to $4.2\times10^{7}S\cdot m^{-1}$, nearly 70 per cent of bulk copper). This technology might provide a potential way to realize surface metallization on ceramicsubstrates applied in electronic circuits and devices.

Keywords: ceramic; polydopamine; surface modification; electroless copper plating; adhesion.