Supporting Information

Superhydrophobic copper surfaces with anti-corrosion properties fabricated by solventless CVD methods

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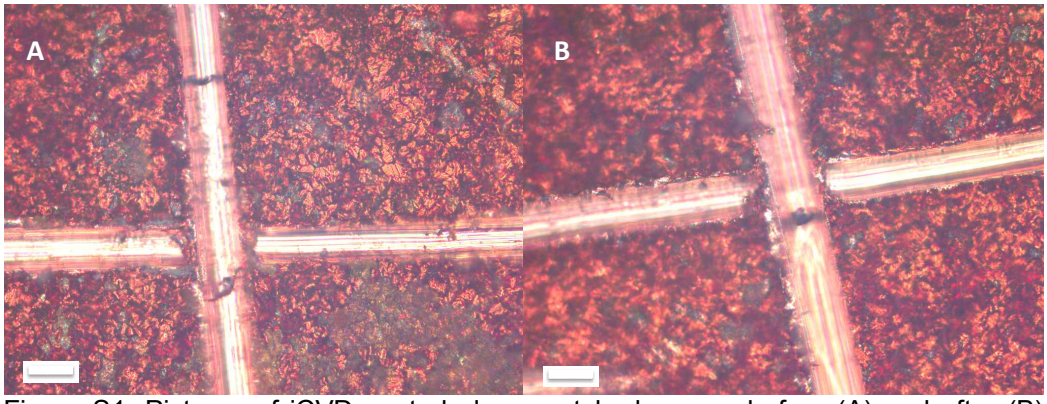

Figure S1. Pictures of iCVD coated plasma etched copper before (A) and after (B) removal of the scotch tape during the adhesion test. The test was conducted according to ASTM D 3359. There is no evidence of flakes or coating peeling off after the test, thus the adhesion between coating and substrate was classified as 5B, very good adhesion. Both scale bars correspond to 50 μm.

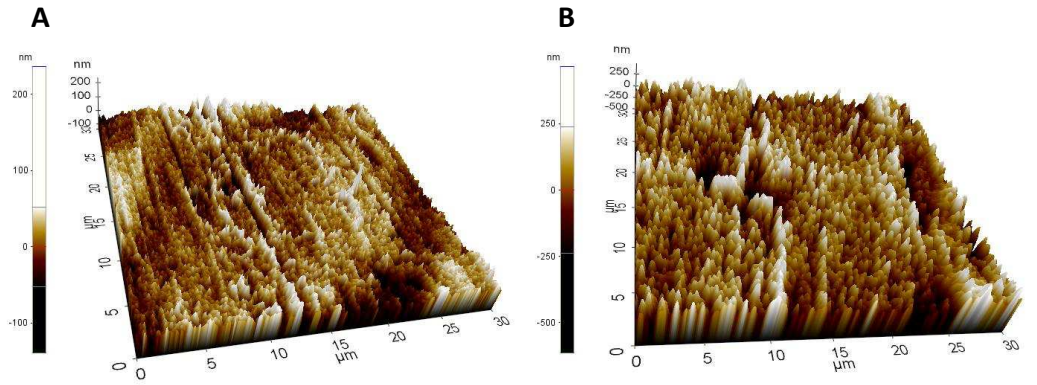

Figure S2. 3D AFM images (30x30 µm) of copper surfaces after different plasma treatments. In image A, the sample was treated with Ar plasma at 100 W for 5 min. In comparison to bare copper (Figure 3a), the plasma treatment leaded to a planarization of the surface and the appearance of nanoroughness due to the ion bombardment, resulting in a roughness of 27 nm. In image B, the sample was treated with a mix of Ar-O_2 plasma (ratio 1 to 2) at 100 W for 20 min. The surface displays more pronounced features and higher roughness (122 nm) than image A probably due to a longer exposure to plasma conditions. In general, these conditions were not enough to achieve a microstructure similar to that obtained using wet etching (Figure 3b).

Figure S3. Image of a copper sample after exposure to O_2 plasma at 150 W for 5 minutes. A dark layer of copper oxide was formed after the O_2 plasma. The bright spots observed correspond to the copper substrate where the oxide layer was peeled off. The oxide layer was easily removed because of the poor adhesion with the substrate.

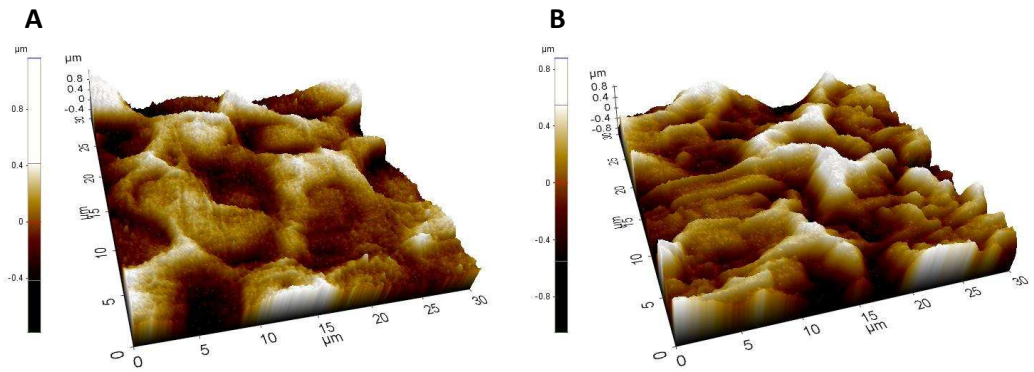

Figure S4. 3D AFM images (30x30 µm) of copper after the first O_2 plasma treatment (A) and after the first cycle of O_2 and Ar plasma (B). The raise in roughness from 40 nm, corresponding to bare copper, to 212 nm, after the O_2 plasma, proves the effectiveness of the plasma treatment to modify the copper surface. In addition, the posterior Ar plasma increases the roughness to 279 nm as a result of the sputtering effect of the plasma. The removal of part of the oxide layer prevents the peeling of the oxide, and thus, enhances the adhesion with the substrate layer. A second plasma cycle results in a roughness of 430 nm, with a structure comparable to the one obtained by wet etching (Figure 3).