

## Cold Spray Deposition of SS316L Powders on Al5052 Substrates and Their Potential Using for Biomedical Applications

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**Abstract :** The corrosion behaviour of 316L stainless steel coatings obtained by cold spray method was investigated in this study. 316L powders were deposited onto Al5052 aluminum substrates. The coatings were produced using nitrogen ( $N_2$ ) process gas. In order to further improve the corrosion and mechanical properties of the coatings, heat treatment was applied at 250 and 750 °C. The corrosion performances of the coatings were compared using the potentiodynamic scanning (PDS) technique under *in-vitro* conditions (in Ringer's solution at 37 °C). In addition, the hardness and porosity tests were carried out on the coatings. Microstructural characterization of the coatings was carried out by using scanning electron microscopy attached with energy dispersive spectrometer (SEM-EDS) and X-ray diffraction (XRD) technique. It was found that clean surfaces and a good adhesion were achieved for particle/substrate bonding. The heat treatment process provided both elimination of the anisotropy in the coating and resulting in healing-up of the incomplete interfaces between the deposited particles. It was found that the corrosion potential of the annealed coatings at 750 °C was higher than that of commercially 316 L stainless steel. Moreover, the microstructural investigations after the corrosion tests revealed that corrosion preferentially starts at inter-splat boundaries.

**Keywords :** biomaterials, cold spray, 316L, corrosion, heat treatment

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