

عنوان مقاله:

Effect of Ni particle size on interfacial intermetallic formation of cold sprayed Ni coatings on Ti substrate

محل انتشار:

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خلاصه مقاله:

Ni coatings have been applied to Ti (alloy) substrates with different coating methods to improve their wear resistance after post spray heat treatments (PSHT) by promoting intermetallic phases formation. In this research Ni coatings deposited on commercially pure Ti substrate using the Cold Gas Dynamic Spraying (CS) technology. Two gas atomized spherical fine and medium size Nickel powders respectively with mean particle sizes of 6.63 and 24.53 μm were sprayed using same processing conditions (gas temperature and pressure, nozzle-to-substrate distance) to evaluate the particle size distribution influence on coating quality, interface morphology and bonding. The resulting coatings and interface morphologies were evaluated using scanning electron microscopy (SEM) and micro-hardness. PSHT were employed to promote interfacial intermetallic components (IIMC) growth at 700 and 800 $^{\circ}\text{C}$ for 5, 60 and 180 minutes to assess interfacial bonding features of Ni (coating)/Ti (substrate) in CS. Nickel coatings sprayed with fine nickel powder showed lower deposition efficiency and higher level of micro-hardness compared to the nickel coatings sprayed with medium size Ni powder. Ni coating sprayed with medium size Ni powder showed more uniform IIMC indicating that this coating developed better metallurgical bonding in comparison. Micro-pores were formed at the interface of both coatings which is more evident in nickel coating sprayed with fine Ni powder. It has been found that interfacial pores of Ni/Ni₃Ti interface formed as result of Kirkendall effect and bonding characteristics of coatings

کلمات کلیدی:

Cold spray, Coating, post-spray heat treatment, Ni-Ti, Intermetallic

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