**Cold Sprayed Boron Nitride Nanotube-Reinforced Aluminum Matrix Composite: Tribological and Radiation Shielding Properties**

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The never-ending quest for multifunctional properties and low-density materials demands reinforcing structural metals with secondary fillers. This study presents the influence of cold spray processing on the integration of one-dimensional boron nitride nanotubes (BNNTs) into aluminum (Al) matrix composite deposits. Successful deposition of Al-BNNT composite was achieved by pre-spray dispersion of BNNTs onto Al powder via ultrasonication. Pure Al powder deposition at 380°C was limited by nozzle clogging, restricting the deposit thickness to 200 µm, while the presence of BNNTs enabled longer spraying at 450°C due to nozzle cleaning and damping effect by ceramic BNNTs, allowing a thicker 2 mm Al-BNNT deposit. Microstructural analysis revealed severely deformed Al splats decorated with uniform distribution of BNNT networks at the intersplat boundaries, reducing the porosity from 8 to 4% and increasing the splat flattening by 40%. Tribological testing demonstrated a 21% improvement in coefficient of friction and a 65% reduction in wear volume in the Al-BNNT composite. Additionally, incorporating 3 vol.% BNNTs enhanced the neutron radiation shielding by 35.1%. These improvements in the composites are attributed to reduced porosity, enhanced splat flattening, and the inherent properties of BNNTs, such as high strength, the ability to produce tribofilm lubrication during dry sliding wear, and their high neutron absorption cross-sectional area.