

Microstructure of Ti - AlN Composite Produced by Selective Laser Melting

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Abstract : Selective Laser Melting (SLM) is an advanced additive manufacturing technique used for producing parts made of wide range of materials such as: austenitic steel, titanium, nickel etc. In the our experiment we produced a Ti-AlN composite from a mixture of titanium and aluminum nitride respectively 70% at. and 30% at. using SLM technique. In order to define the size of powder particles, laser diffraction tests were performed on HORIBA LA-950 device. The microstructure and chemical composition of the composite was examined by Scanning Electron Microscopy (SEM). The chemical composition in micro areas of the obtained samples was determined by of EDS. The phase composition was analyzed by X-ray phase analysis (XRD). Microhardness Vickers tests were performed using Zwick/Roell microhardness machine under the load of 0.2kG (HV0.2). Hardness measurements were made along the building (xy) and along the plane of the lateral side of the cuboid (xz). The powder used for manufacturing of the samples had a mean particle size of 41 μ m. It was homogenous with a spherical shape. The specimens were built chiefly from Ti, TiN and AlN. The dendritic microstructure was porous and fine-grained. Some of the aluminum nitride remained unmelted but no porosity was observed in the interface. The formed material was characterized by high hardness exceeding 700 HV0.2 over the entire cross-section.

Keywords : Selective Laser Melting, Composite, SEM, microhardness

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