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Characterization of gas atomized Ti-6Al-4V powders for additive manufacturing

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ABSTRACT:

In this paper, titanium powders from various sources were characterized to compare powder integrity for additive manufacturing by selective laser melting process. Selective laser melting by powder-bed based Additive Manufacturing (AM) is an advanced manufacturing process that bonds successive layers of powder by laser melting to facilitate the creation of engineering components. This manufacturing approach facilitates the production of components with high geometrical complexity that would otherwise be impossible to create through conventional manufacturing processes. Although the use of powder in AM is quite common, powder production and optimization of powder properties to yield desired performance characteristics has posed a serious challenge to researchers. It is therefore critical that powder properties be studied and controlled to ensure reliability and repeatability of the components that are produced. Typically, the desired feature of high quality titanium metal powders for AM are a combination of high sphericity, density and flowability. Scanning electron microscopy, EDS, particle size distribution and powder rheology were extensively performed to investigate the properties of gas-atomized Ti-6Al-4V powders.