

Production of additive manufacturing powders by thermal plasma

The new frontiers of additive manufacturing (AM) involve several emerging printing techniques that promise to revolutionize the manufacturing processes in many industrial fields. Indeed, the “additive” approach allows to create objects with geometries and shapes unobtainable by using the classic “subtractive” one. This increased attention toward 3D printing techniques attracts great interest in the development of new printing materials from polymers and resins to metals and ceramics. Among these, metal powders represent a rapidly growing market. The development of spherical ones, with high packing capacity and therefore good flowability, becomes a primary requirement for printing. Usually, these powders are produced by Water Atomization (WA) and Gas Atomization (GA); however new techniques such as Plasma Atomization (PA) and Plasma Spheroidization (PS) are gaining increasing interest. In this frame, ENEA developed a new prototypal plant for the production of powders for AM; the system based on DC thermal plasma technology, was own designed and installed at ENEA Portici Research Center. The experimental work was carried out on angular powders with the aim of exploring the potentiality of the plant and identify the best process parameters for the production of spherical powders. Trials was planned on both metal and ceramic powders and also considering secondary raw materials as feedstock, promoting the closure of the cycles.