Editorial

Introduction to the Special Issue on Additive Manufacturing

Editorial Board of Special Issue on Additive Manufacturing

Additive manufacturing (AM), also known as 3D printing, is a technology that produces three-dimensional parts layer by layer from a material. AM has existed at various levels of sophistication for decades. However, it has only recently caught the widespread attention of industries and policy makers thanks to technological breakthroughs and advancements in the past decade that allow full-scale metallic components and structures to be made to high standards. No longer solely a prototyping technology, AM is now being used for the production of series components for the most demanding applications. It is definitely a disruptive—if not revolutionary—manufacturing technology, as it totally changes the traditional way of making products. The biggest advantage of this technology is its capacity to make parts with any free form, thus paving the way for free and complex part design. Components and integrated structures with complex designs that would not have been possible just a few years ago can now be made according to various requirements. The net-shape manufacturing capacity of AM allows a considerable saving of materials, conventional thermomechanical processing, and machining processes, making it an environmentally friendly manufacturing technology. These are the main reasons why AM is increasingly attracting attention and making a great impact on a number of industries such as the aerospace, military, nuclear, and medical industries. While significant advances have been made in AM, there are also a number of challenges that need to be addressed for the future development of this technology. These include heat source-material interaction, defect formation mechanisms, microstructural control, process monitoring and control, and so forth. In general, as a smart, digital, and environmentally friendly manufacturing technology, AM represents the trend for future manufacturing technology development and is expected to play an increasingly important role in high-end product manufacturing and in promoting global economic development. In-depth scientific study and technological innovations are the key for this technology to be developed to a new level.

This special issue of *Engineering* on AM presents nine papers from selected experts all over the world and serves as a source of useful information on new developments in fundamental scientific research, technological innovation, and new applications of additively manufactured metals, plastics, and biomaterials. The papers in this special issue focus on the following topics: ① thermodynamic and kinetic mechanisms for AM, ② modeling and simulation of selective laser melting (SLM) and electron beam melting (EBM), ③ 3D printing of shape memory alloys, ④ 3D printing for medical phantoms and regenerated tissues/organs applications, ⑤ servo systems for precision AM, and ⑥ AM-driven innovative design.

We appreciate the contributions of all the authors, reviewers, and editorial board members and thank them for their great efforts and constructive suggestions that helped to bring this special issue to a successful completion.