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WORKSHOP Current advances in additive manufacturing: technologies and materials

Additive manufacturing of metal alloys for sustainable applications

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Advanced manufacturing (AM) processes are at the base of highly competitive products. AM overturns conventional manufacturing processes as mechanical machining and foundry. Design constraints of conventional manufacturing methods can be overcome by AM. The components are realized layer-by-layer according to a Computer Aided Design (CAD) model. Various AM processes have been developed, everyone with its set of materials. Generally, in the case of metal alloys, the material, in the powder form or as filament, is fused locally by an energy source: laser or electrons. Among these processes, the most relevant are the powder bed, laser (LPBF) and electron beam (EBM), and the direct energy deposition (DED), which use powder or filaments.
In other cases, components in metal alloy can be produced by extrusion of a filament charged with high concentration of metal particles or by using a binder for metal particles in powder bed machines. In these cases, the final metal piece can be obtained by washing it in suitable solvents to remove waxes and polymers and by a final thermal treatment of sintering. In this work the use of metal alloy AM within the framework of the Project "Frontier materials and devices for energy applications" is discussed. In particular, the design of a new ferritic allow for specific applications in alkaline corrosive environments and the realization components for sustainable energy production and heat exchange will be presented.

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