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# Development of new alloys for additive manufacturing : application to aluminium alloy for DED process and to titanium alloy for SLM process

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The development of new alloys for additive manufacturing, aiming at specific tailored properties, constitutes a topic of high interest.
• For instance, aluminum alloys are gaining significant attention in additive manufacturing, with numerous commercial alloys entering the market. However, most of these alloys primarily target Laser Powder Bed Fusion (L-PBF) applications i.e., they are optimized to perform exceptionally well under the high solidification and cooling rates characteristic of this additive manufacturing technique. When these alloys are employed in Direct Energy Deposition (DED) applications, such as Laser Metal Deposition (LMD), Wire+Arc Additive Manufacturing (WAAM), and Wire+Laser Additive Manufacturing (WLAM), they often fall short in terms of mechanical performance due to the relatively lower cooling rates compared to L-PBF.
• On the other hand, titanium alloy Ti-6Al-4V has long been the favored choice in the additive manufacturing community due to the ready availability of high-quality powder feedstock. However, there is no fundamental scientific basis to assume that Ti-6Al-4V should inherently show superior mechanical performance in additive-manufactured components. In fact, Ti-6Al-4V exhibits a notable decrease in fatigue and toughness properties due to the intrinsic porosity introduced during the additive manufacturing process. Consequently, post-process Hot Isostatic Pressing (HIP) is routinely applied to critical 3D printed components, increasing both production costs and erasing the initial microstructure achieved during printing.
Those drawbacks call for new alloy development, for both type of alloys.
In this presentation, we aim to introduce the methodologies used for the development of the new alloys, as well as the preliminary results achieved in these studies.

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