Investigating the Influence of Metallic Powder Handling and Storage Conditions on Flowability and Moisture Content

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Metallic powder-based additive manufacturing (AM) processes are capable of producing high-performance parts for a vast set of applications. The success of an AM process is partly determined by the quality of the feedstock powder utilized. If the powder properties, such as flowability and moisture content, are not maintained at a suitable level, then the powder may not demonstrate proper in-process behavior, potentially compromising the success of the process. A common source of powder property degradation stems from repeated exposure to the ambient temperature and humidity during powder handling and storage. Therefore, it is essential to understand how a metallic powder's properties evolve upon environmental exposure during handling and storage. It is the aim of this study to explore the effects of repeated environmental exposure on the flowability and moisture content of aluminum 5056 and tantalum powder for end use in AM applications. The results of this study, as well as the proposed future work, are intended to inform powder-based AM users of the ramifications of powder handling and storage protocols on the processability of their feedstock so that optimal processing can occur.