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Title:

Additively Manufactured Multi-Component Sputtering Target for Tribological Thin Film Physical Vapor Deposition Application

Abstract:

Additive manufacturing is one of the important manufacturing technologies in the age of digital transformation and is also the heart of the fourth industrial revolution. Generally, AM has been used to not only manufacture mechanical components directly, but also manufacture molds to produce massive numbers of components indirectly. In this talk, we introduce new applications of the additive manufacturing as a consumable for thin film physical vapor deposition techniques, i.e., sputtering target for magnetron sputtering. Unlike traditional sputtering target manufacturing processes such as hot pressing, spark plasma sintering, and so on, we utilized directed energy deposition techniques in order to manufacture multi-component sputtering targets of ZrCuSi for current and future automotive applications from internal combustion engines and electric motors. This ZrCuSi has been used to reduce wear and friction by forming ZrCuSiN thin films via a physical vapor deposition. We had successfully demonstrated additive manufacturing of ZrCuSi sputtering target and this target proved its functionality in terms of hardness and friction characteristics. We further showed its sustainability by repairing it for recycling. We anticipate that this approach can be utilized in various physical vapor deposition applications in functional coatings and microsystems, e.g., micro and nano electromechanical systems.

Biography:

Chung-Soo Kim is currently a Senior Researcher at Korea Institute of Industrial Technology (KITECH), South Korea. He received his Ph.D in mechanical and aerospace engineering from Seoul National University in 2013. In 2013 he joined Research Laboratory of Electronics at

Massachusetts Institute of Technology and continued his research on a single nano-digit nanofabrication and non-demolition quantum electron microscope. In 2017 he joined Global Technology Center at Samsung Electronics and worked for advanced manufacturing technologies and digital transformation. In 2019 he joined KITECH and now working on design for manufacturing, additive manufacturing and advanced manufacturing technologies based on electron, ion, and photon beam technologies at various length-scale.

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