

## **Effect of oxidation of metallic 3D printing material on 3D printed object**

KWON, S.K.<sup>1</sup>, Seo, K.h.<sup>1</sup>, Kwak, C.J.<sup>1</sup> and Jin, K.B.<sup>1</sup>

<sup>1</sup> KOREATECH University, Republic of Korea

The Fourth Industrial Revolution brings radical changes in all areas of society, and various prospects are being made. The manufacturing industry cannot be excluded. 3D printing has become a key technology in the manufacturing industry.

Metallic 3D printing materials are being sold at a high price, and residual powders are being recycled. Inherently to the properties of metals, their 3D printing requires a high level of energy input. During the manufacturing process a large amount of heat is generated that causes oxidation of the remaining material.

In this work, we investigate the effects of oxidation degree of recycled materials on the thermal conductivity and durability of 3D printed molds with conformal cooling channels. We found that a larger degree of oxidation leads to a significant decrease in hardness and thermal conductivity within the 3D printed part. This can be explained by the larger amount of porosity when using oxidized metallic powders as 3D printing material.