

OR1102

**The Development of a Zr-Cu-Al-Ag-N TFMG Coating in Pursuit of Improved Mechanical, Thermal, and Antimicrobial Property for Bio-medical Application**

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This study focuses on the antimicrobial property of Zr-Cu-Al-Ag-N thin film metallic glass (TFMG). The Zr-Cu-Al-Ag-N TFMGs with various N contents were successfully fabricated by manipulating the working power of Zr-Cu-Al-Ag target and nitrogen flow rate in the DC magnetron sputtering process. The mechanical and thermal properties of Zr-Cu-Al-Ag-N TFMG will be significantly increased as the N content raises from 0 to 15 at. %.

Liquid culture and plate counting methods are used to assess the antimicrobial performance of TFMGs. The antimicrobial rate against *Escherichia coli* (*E. coli*) under Japanese Industrial Standard JIS Z2801: 2000 is over 95%. It is revealed that the deposited Zr-Cu-Al-Ag-N TFMG modified the surface of SS 304 stainless steel substrate, and their improved anti-microbial efficiency against *E. coli* is attributed to amorphous smooth surface and the release of copper ion. Finally, a Zr-Cu-Al-Ag-N TFMG with appropriate composition to exhibit improved hardness, thermal stability, and antimicrobial ability was revealed and discussed.

**Keywords**

Metallic Glass

Magnetron Sputtering

Mechanical Property

Antimicrobial Ability