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YSZ/MoS₂ Self-Lubricating Coating Fabricated by Thermal Spraying and Hydrothermal Reaction

Shuangjian Li,^{1,2} Xiaoqin Zhao,¹ Yulong An,^{1*} Duanduan Liu,^{1,3} Huidi Zhou,¹ Jianmin Chen,^{1,*}

¹*State Key Laboratory of Solid Lubrication, Lanzhou Institute of Chemical Physics, Chinese Academy of Sciences, Lanzhou 730000, People's Republic of China*

²*University of Chinese Academy of Sciences, Beijing 100049, People's Republic of China*

³*School of Chemistry and Chemical Engineering, North Minzu University, Yinchuan 750021, People's Republic of China*

csuayl@sohu.com;

chenjm@licp.cas.cn

*Corresponding authors: Tel: +8609314968085; fax: +8609314968138.

Abstract

Thermal sprayed ceramic coatings have extensively been used in components to protect them against friction and wear. However, the poor lubricating ability severely limits their application. Herein, yttria-stabilized zirconia (YSZ)/MoS₂ composite coatings were successfully fabricated on steel substrate with the combination of thermal spraying technology and hydrothermal reaction. Results show that the synthetic MoS₂ powders are composed of numbers of ultra-thin sheets (about 7 ~ 8 nm), and the sheet has obvious lamellar structure. After vacuum impregnation and hydrothermal reaction, numbers of MoS₂ powders, look like flowers, generate inside the plasma sprayed YSZ coating. Moreover, the growing point of the MoS₂ flower is the intrinsic micro-pores of YSZ coating. The friction and wear tests under high vacuum environment indicate that the composite coating has an extremely long lifetime (> 100,000 cycles) and possesses a low friction coefficient less than 0.1,

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