Interfacial Nanostructure of 2D Ti3C2/Graphene Quantum Dots Hybrid Multicoating for Ultralow Wear

Por: Yin, X (Yin, Xuan)[1]; Jin, J (Jin, Jie)[2]; Chen, XC (Chen, Xinchun)[1]; Rosenkranz, A (Rosenkranz, Andreas)[3]; Luo, JB (Luo, Jianbin)[1]

ADVANCED ENGINEERING MATERIALS
Volumen: 22
Número: 4
Número de artículo: 1901369
DOI: 10.1002/adem.201901369
Fecha de publicación: APR 2020
Acceso anticipado: FEB 2020
Tipo de documento: Article
Ver impacto de la revista

Abstract

The 2D Ti3C2/graphene quantum dots (GQDs) composite coating contains numerous merits, which offers underlying solutions for lubrication issues in common conditions. Herein, specific efforts are devoted to explore and develop the antiwear interfacial performances of 2D Ti3C2/GQDs hybrid multicoating in common environment. In addition, combination with nanodiamond would impose significant effects on improving lubricity of binary composite coating to obtain long-durability ternary composite coating. Meanwhile, macroscale and atomicscale characterizations are utilized to detect the lubrication behavior of binary and ternary composite coating to illuminate the influence of compositions on the establishment of ultralow-wear interfaces on slip process. These testing results highlight an outspread lubrication mechanism for 2D Ti3C2/GQDs hybrid multicoating. They suggest that 2D Ti3C2/GQDs and 2D Ti3C2/nanodiamond/GQDs composite coating exhibit ultralow wear with rubbing against polytetrafluoroethylene ball. A newly nanostructured tribofilm is formed on the sliding contact. Also the 2D Ti3C2/nanodiamond/GQDs ternary coating has long-durability and ultralow-wear during sliding for a long time.

Palabras clave

Palabras clave de autor: graphene quantum dots; hybrid multicoating; ultralow wear; 2D Ti3C2
KeyWords Plus: TRIBOLOGICAL PROPERTIES; HIGHLY EFFICIENT; SOLID-LUBRICANT; REDUCE FRICTION; GRAPHENE; STEEL; NANOPARTICLES; NANODIAMOND; PERFORMANCE; COMPOSITES

Información del autor

Dirección para petición de copias: Chen, XC; Luo, JB (autor para petición de copias)

+ Tsinghua Univ, Dept Mech Engn, State Key Lab Tribol, Beijing 100084, Peoples R China.

Dirección para petición de copias: Jin, J (autor para petición de copias)

+ Beijing Jiaotong Univ, Sch Mech Elect & Control Engn, Beijing 100044, Peoples R China.

Direcciones:

+ [1] Tsinghua Univ, Dept Mech Engn, State Key Lab Tribol, Beijing 100084, Peoples R China

+ [2] Beijing Jiaotong Univ, Sch Mech Elect & Control Engn, Beijing 100044, Peoples R China

+ [3] Univ Chile, Dept Chem Engn Biotechnol & Mat, FCFM, Santiago 8370456, Chile

Direcciones de correo electrónico:jiejin@bktu.edu.cn; chenxc1213@mail.tsinghua.edu.cn; jbluo@tsinghua.edu.cn

Financiación

Entidad financiadora Mostrar más información	**Número de concesión**
National Natural Science Foundation of China	51905295 51975314
China Postdoctoral Science Foundation	2019M660619
Tsinghua University Initiative Scientific Research Program	20197050026
Comision Nacional de Investigacion Cientifica y Tecnologica (CONICYT) CONICYT FONDECYT	11180121
VID of the University of Chile	

Ver texto de financiación

Editorial

WILEY-V C H VERLAG GMBH, POSTFACH 101161, 69451 WEINHEIM, GERMANY

Información de la revista

- **Impact Factor:** Journal Citation Reports

Categorías / Clasificación

Áreas de investigación: Materials Science

Categorías de Web of Science: Materials Science, Multidisciplinary

Información del documento

Idioma: English

Número de acceso: WOS:000512016400001

ISSN: 1438-1656

eISSN: 1527-2648