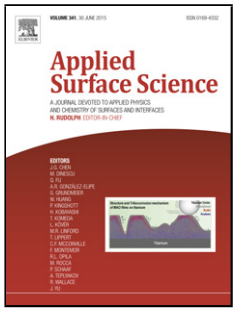

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Microstructure and corrosion resistance of a fluorosilane modified silane-graphene film on 2024 aluminum alloy

Yuchao Dun, Xuhui Zhao, Yuming Tang*, Sahib Dino, Yu Zuo*

Beijing Key Laboratory of Electrochemical Process and Technology for Materials,

Beijing University of Chemical Technology, Beijing 100029, China

*Corresponding author, E-mail: zuoy@mail.buct.edu.cn; tangym@mail.buct.edu.cn

Highlights

- Silane /graphene film modified by fluorosilane was prepared on aluminum alloy.
- The film was relatively thick about 12 μm and showed good thermal shock resistance.
- The film showed good corrosion resistance for aluminum alloy in NaCl solution.
- By adding fluorosilane, the water contact angle of the film increases to 113.8°.
- Less interfaces and higher crosslink degree improved barrier property of the film.

Abstract: Heptadecafluorodecyl trimethoxysilane (FAS-17) was incorporated into γ-(2,3-epoxypropoxy) propyltrimethoxysilane/graphene (GPTMS/rGO) by adding pre-hydrolyzed FAS-17 solution in GPTMS solution, and a hybrid silane-graphene film (FG/rGO) was prepared on 2024 aluminum alloy surface. The FG/rGO film showed better thermal shock resistance, good adhesion force and high micro-hardness, compared with GPTMS/rGO film. In neutral 3.5 wt% NaCl solution, the corrosion current density for 2024 AA sample with FG/rGO film was 3.40 $x10^{-3}$ μA/cm^2, which is about one fifth of that for the sample with GPTMS/rGO film. In acidic and alkaline