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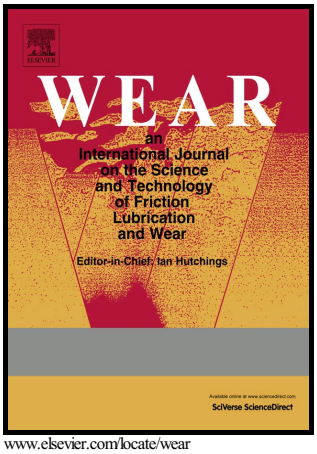

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ANTIBIOCORROSIVE EPOXY-BASED COATINGS WITH LOW FRICTION AND HIGH SCRATCH RESISTANCE

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ABSTRACT

We have created inorganic-organic hybrid composites and antibiocorrosive coatings based on an epoxy modified with silicon-containing polyepoxies and bioactive coordination compounds. The scratch resistance was determined using a conical diamond indenter with linearly increased load. Repetitive scratching along the same groove (sliding wear determination) was also performed. Whether in single or in repetitive scratching, for most hybrids the residual depth is shallower than for the pure epoxy. Dynamic friction was determined on a pin-on-disk tribometer using steel pins. Lower friction is accompanied by higher scratch resistance. Surface morphology seen in scanning electron microscopy (SEM) shows that increasing modifier content causes more ductile behavior with less crack nucleation; no debris formation is observed. The composites were also characterized by differential scanning calorimetry (DSC) and thermogravimetric analysis (TGA). Isothermal aging and water absorption ability (W_{H2O}) of the hybrids were determined. The hybrids are optically transparent, visually homogeneous, with smooth surfaces.

KEYWORDS: polymer scratch resistance; polymer friction; polymer aging; water absorption.

1. INTRODUCTION

Friction is a key materials property, studied already by Leonardo da Vinci who formulated certain relationships describing it in 1493 [1]. Friction of metal surfaces can be mitigated by liquid lubricants, but for polymers such lubricants often cause swelling and other approaches have to be developed [2, 3].