PO2027

Electro-tribological study of dielectric surfaces.

Iñigo Braceras[1], Xabier Velasco[2], Marta Brizuela[1], Iñaki Garmendia[2], Jose Angel Sanchez-Garcia[1]

[1]Tecnalia Research & Innovation, Donostia-San Sebastian, Spain [2]Engineering School of Gipuzkoa, Donostia-San Sebastian, Spain

inigo.braceras@tecnalia.com

The possibility of studying simultaneously electrical and tribological properties is of special interest in various fields. In the case of dielectric coatings, the performance and operative endurance of such coatings can be assessed on conditions simulating the sliding contact setting. Properties of gradient or non-homogeneous multilayered coatings and surfaces can also be studied in detail, as wear gradually leads to deeper regions, with their corresponding electrical and tribological properties.
In this work, the authors have studied such properties on DLC coatings. The aim of the work was twofold: the study of the life of different dielectric coatings in sliding electrical contacts, and the study of the electrical and tribological properties of different regions in those coatings, in various working conditions in terms of humidity, contact pressure, sliding speed, etc.
The coatings were deposited on electrical grade copper (Cu-Etp EN-13601 R250) and tested against aluminum. Besides tribological and electrical properties of the coatings, other properties such as structure (by Raman), wettability (contact angle), thickness and morphology (SEM/EDS), adhesion (scratch test) and roughness (profilemetry) were studied. Wear tracks were also assessed (SEM/EDS and profilmetry) to identify damage mechanisms and the multiple coating regions.
Additionally, simulation of the experimental data was performed and an equivalent electric circuit proposed.
Results showed that electro-tribological tests can provide insightful information on the performance of dielectric coatings and about the interpretation of the reasons behind it, thus facilitating further development and optimization of the coatings.

Keywords
electro-tribology
wear
dielectric coating
DLC
simulation