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“Influence of grafting properties of organic thin films for low level electrical contacts protection”

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Thin layer of hard gold can act as good “lubricants” for separable connectors, but because of corrosion and wear mechanisms, additional protection is necessary. Organic thin films can be used in many different forms, from liquid to solid, and many studies have been reported in the past. The present work shows the major influence of three properties:

- the grafting of the film on the substrate,
- the film “cohesion” or “hardness”
- the film surface energy.

on the friction behaviour, the corrosion properties and the electrical characteristics of ball on plane contacts. Usual dedicated devices were used to measure friction and contact resistance values, as well as various physico-chemical analysis tools (XPS, contact angle, IR, AFM).

The aim of the present study is to assess the influence of grafting an organic layer on gold coatings and to try to modelize it.

Liquid films grafted by functional groups were compared to non grafted ones. Thin solid films of different types (polyacrylonitrile, methacrylate composites, diazonium for example) were studied and their friction and electrical properties were analysed in relation to their grafting, surface energy and cohesion characteristics. The results of this study should help tailoring the properties of solid films for electrical contacts protection.