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Non Traumatic Chemical Metalization of Polyimide Films and Their Blends

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Metallized polyimide (PI) films have been prepared by heterogeneous chemical modification of PI surface. Suggested technology includes several chemical conversion steps such as hydrolysis, chelation by metal salts and reduction, which does not require any complicated procedures. It can be carried out in mild conditions at room temperature without aggressive agents. This allows the formulation of metal phase thus simplifying both the technology and allowing the use of commercial PI films, such as Kapton® HN and Upilex® S. The employment of in situ chemical reactions in the modified near-surface layers of PI films allows us to impregnate the surface by inserting and infusing metals strongly into the films, thus avoiding poor metal-PI adhesion completely. Such a procedure, is relatively cheap, and does not complicate technology of metallization of PI films and allow to produce electro-conductive metallized PI having reflective surface with fine integral optical characteristics (viz. flexible mirrors).

Measurements of reflectivity in the visible range and surface resistivity at elevated temperatures show that 90-92% reflectivity coefficients of silvered (metallized) films and surface resistivity of about 0.5 ohm/cm was achieved. Deposition of a second metal layer by electrochemical process on the silvered PI films further improved the stability and reflectivity up to 98%. Electro-conductive silver layer also provides the possibility for deposition of different metals, such as: palladium, platinum, gold, rhodium, cobalt, nickel and their alloys in mild conditions. This treatment increases the stability toward the damaging and destructive effect of atomic oxygen, one of the main damaging factors in outer space environment, and also raises abrasive stability without any delamination effect.

In vue to broaden thermo-mechanical behavior of PI materials itself and to regulate optical and physical properties of their metallized constructs, new polymeric blends based on alicyclic polyimide and polycarbonate or polysulfone have been prepared and studied.

Novel metallization technology and thermal stability of metallized films are presented and discussed.

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References

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