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9

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Title
Development And Characterization Of Modified Silicone – Dammar Coating Resin

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The purpose of this study is to develop and characterized the new modified silicone binder resin. The silicone, synthetic resin bought from Dow Corning Corp. and dammar bought from local supplier. Ten (10) samples were prepared and one of them was silicone resin without dammar. The samples were designated as SD0, SD5, SD10, SD15, SD20, SD25, SD30, SD35, SD40 and SD45. The mixture was coat onto aluminum q-panel using spin coater and left in room temperature for around 7 – 8 days for curing process. The cured samples were undergone the mechanical and electrochemical characteristic. The mechanical characterizations include viscosity, cross-hatch test, pull off test, wetting and impact test. Results for cross hatch test showed that 5-15 wt% of dammar in the silicone resin provide the better adhesion on aluminum q-panel with the edges of the cut are smooth and none of the square lattice detached. In the impact test, no fracture can be observed on the impact surfaces when the 1 kg load was released on SD0 – SD20 dried coating surfaces. The pull off test result showed that SD15 requires the highest pressure to pull the coating thin film off the substrate. While, SD20 showed highest non-wetting angle at 90.13 degree and SD10 had the highest surface tension energy at 179.80 J in the contact angle experiment. While, electrochemical characterizations include FTIR, TGA, XRD, thermal conductivity and impedance spectroscopy. In comparison of SD resistivity data measurement, it was found that SD15 showed stable value at average log R = 6. This proves the SD15 cured coating did not deteriorate under 3% saline solution. Thus FTIR spectra depicts a complexation of reactions occurs around 1700 cm-1 due to dammar added especially at SD15 spectra. However, dammar tends to be decomposed when it undergone the TGA characterization. It is the nature of dammar, when people usually used dammar for the torch. Thermal barrier characterization reveals the small k-value for all SD unless SD20 and SD25. The X-ray diffractions confirm the crystalinity pattern of pure silicone exist in every sample but SD15 shows one highest intensity that make it more crystalline than others. After all, the SD15 showed good performance of mechanical and electrochemical characterizations. The high technology of nanoindentation and nanoscratch also used to measure the coating adhesion. SD15 is good combination because it is soft with hardness of 1.624 GPa but buckling functional of molecule is 4.64 x 106 beside it is also stiff at 6.67 x 104. These properties make SD15 a suitable binder. The increase of dammar content can provide the substrate a better mechanical protection like scratch resistance, scratch hardness and higher elastic recovery. In comparison among the four selected SD samples, SD40 shows the highest scratch resistance and elastic recovery. Overall, SD15 showed the result of soft coating and SD10 as the harder coating with highest value of stiffness. The FTIR result showed the SD15 have good chemically interaction between silicone and dammar molecules. In addition, SD5 to SD15 have good resistivity of thermal conductivity. These results make SD15 the best composition.