

Contact electrification between polytetrafluoroethylene and steel

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Abstract—Contact electrification between steel and polytetrafluoroethylene (PTFE) was studied using a self-developed apparatus for measurement of contact electrification charge. The effects of contact area, load, and stress on charge magnitude and charge density were studied. Medium carbon steel disks with different diameters were used to achieve varied contact areas. PTFE plates were used as the counterpart samples. The experiments of contact electrification were conducted at the low pressure environment of 3Pa. The results show that electrification charge increased with nominal contact area under a certain load, and the charge density was a constant. While kept nominal area unchanged, charge was linearly proportional to contact load. Surface topograph was measured. Correlation of electrification charge and contact parameters including load, stress, nominal contact area and real contact area is analyzed. It is suggested that contact electrification charge is influenced by both real contact area and contact stress.