FF28P Generation and application of triboplasma

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Tribology is the study of friction, wear, and lubrication. A tribo-emission process is defined as the emission of electrons, ions, photons, phonons etc. due to tribological damage, and a discharge generated by electrical breakdown at a sliding contact is called a triboplasma. The study of triboplasmas is of significant interest for understanding tribological phenomena in terms of electrical charging. On the other hand, application of triboplasma for surface modification is not extensively studied. However, a triboplasma might, like other discharge plasmas, improve the adhesive properties of certain surfaces. The method would be attractive, since the generation of a triboplasma is simple, its treatment effect is expected to be similar to that of normal process plasmas, and simultaneous mechanical rubbing can synergetically enhance the treatment effect. It is noted that a triboplasma can be generated without severe abrasion at the sliding surfaces, and so the resultant surface modification can be distinctively different from that with the conventional mechanical roughening.
In the present work, desirable tribological conditions for generating a triboplasma will be discussed based on the Hertzian contact model so as to apply for triboplasma induced surface modification affecting the adhesive properties of the exposed surfaces.