Identification of the induced polarization and charge distribution between the electrode and objects for high adhesion force

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Electroadhesion adhesion force was developed at the interface between the electrode and objects across the insulation dielectric layer, and it can find applications for picking tools or robot hands as an alternative technique for mechanical or vacuum-assisted grippers. In this study, the electroadhesive device was fabricated by three layers (flexible support layer, electrode and insulation layer) to lift various objects, and the electrode design pattern was varied with different thickness and space of the electrodes to find the relationship between the electrode geometry and the object polarization. In addition, we identified that the total length of the electrode boundary edges length was the key factor for the lifting adhesion forces by measuring induced polarization developed on the objects across the insulation layer. We measured the induced polarization in the presence of different objects and identified that the quantities of permittivity developed on the objects was closely related to the lifting forces comparing objects made from paper, glass, and metal.