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

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Electroadhesive device is available for picking almost any objects that includes various types and shapes of the materials, through the electrostatic force (Maxwell force) developed at the interface between the device and the object. The crucial design factors based on the fundamental principles of interfacial polarization have yet to be identified. In this study, the electroadhesive device was fabricated by three layers (support layer, electrode and insulation layer) to lift various objects, and the electrode design pattern was varied with different width and space of the electrodes to find the relationship between the electrode geometry and the object polarization. In addition, we identified that the electrode boundary edges length was the key factor for the lifting adhesion forces by measuring induced polarization. Hence, we have increased the boundary length ratio (micropattern) to enhance the areal adhesion force. Also, 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.