

Investigation of Triboelectrification by *in-situ* X-ray Photoelectron Spectroscopy

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Abstract

Contact electrification (tribo-electrification) is usually found in the contact and separation between two different or identical materials to result in generation of an electrical and opposite charge on each surface. It had been observed over 2000 years in the industrial fabrication and human activity. Derived from this phenomenon, the triboelectric nanogenerators (TENGs) harvest the kinetic energy from the human motion, wind, etc to generate electricity. Although tribo-electric effect is studied for a long time, its mechanism is still unclear. Based on the many studied efforts, the hypotheses of tribo-electric mechanism have been proposed as (1) electron exchange, (2) ion exchange, and (3) material transfer.

In order to understand the tribo-electric effect and mechanism, we select a high-performance system, a polymer-metal setup, and monitor the chemical and electronic structure by *in-situ* synchrotron radiation X-ray photoelectron spectroscopy (SR-XPS) with high surface sensitivity. After polymer-metal contact, the work function difference and chemical fragments are observed by spectroscopic results simultaneously, indicating the broken covalent bonding from polymer to form a charged surface.

Keywords - contact electrification, triboelectric nanogenerator (TENG)