Tribology in Triboelectric Nanogenerators: Assessing Durability Issues

CATEGORY OR KEYWORD
TENG, surface, asperity

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INTRODUCTION

The triboelectric effect (or contact electrification) has long been understood as the process of electrical charge transfer resulting from the mechanical contact of material surfaces [1]. The underlying mechanisms that contribute have been the subject of much research [2,3] and applications have been developed in order to harness and control this charge transfer for a variety of purposes [4]. This paper will focus on the development of quantitative methodologies for characterising the triboelectric properties of materials on the macroscale and assessing the topography and surface chemistry effects of materials as a function of time as their surfaces evolve [5,6].

The methodology in question involves the development and construction of a novel test apparatus, capable of replicating and analysing the electrical output and tribological properties of a scaled-up triboelectric nanogenerator (TENG). This allows for tribological parameters to be correlated with triboelectric properties such as contact potential difference, induced current and charge polarity for different material pairings, both insulating and conductive. The change in surface topography and the development of transfer films will be the focus of this paper; assessing the “tribology” aspects of TENGs and the evolution of triboelectric properties with time.

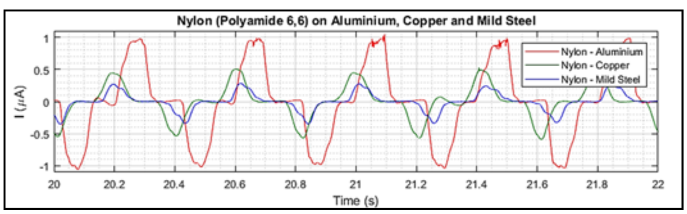

Fig.1 Current induced by relative charge movement within a 50x50mm reciprocating (50mm stroke at 2.5Hz) sliding contact with different material pairings as part of the proposed methodology.

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