

Self-Powered Devices Based on Triboelectrification

Abstract:

Designing devices with self-powered sensing function has become a popular research field since its emergence in recent decades. Triboelectrification occurs when two materials come into contact with each other, causing charge transfer that leads to oppositely charged surfaces; the amount of charge transfer varies depending on material composition. By combining triboelectrification with electrostatic induction, relevant devices can be designed. If used for energy collection purposes, scientists generally refer to them as Triboelectric Nanogenerators (TENGs); but if used for self-powered sensing purposes, scientists call them Triboelectric Nanosensors (TENSs). In our previous research on TENSs, we demonstrated the concept of selective detection of some targets by specific materials or their surface-modified probes. When the targets are adsorbing or binding to the surface, different electrical output signals will be generated compared to before, and these changes can be used for qualitative and quantitative analysis of the targets. In the past few years, we have further developed solid-liquid TENSs for measuring targets such as metal ions, small molecules, proteins and microorganisms. Compared with our previously developed solid-solid TENSs, we have not only improved several shortcomings but also established sensing mechanism and working principle which are very important research achievements in this field. We also look forward to expanding the applications of the solid-liquid TENSs in the near future.

Bio:



Zong-Hong Lin

Professor, National Taiwan University

Dr. Zong-Hong Lin received his PhD from the National Taiwan University (NTU) in 2009 and continued with his postdoctoral research at the NTU and the Georgia Tech during the years of 2010-2014. Subsequently, Dr. Lin joined the Institute of Biomedical Engineering, National Tsing Hua University (NTHU) as Assistant Professor in 2014 and was successfully promoted to Associate Professor and Full Professor in 2017 and 2021, respectively. At the same time, Dr. Lin was also an adjunct faculty at the Department of Power Mechanical Engineering and Department of Chemistry. In 2023, he moved to the Department of Biomedical Engineering at NTU. He has published more than 150 SCI papers (sum of the times cited: 14997, h-index: 59), as well as received recognition for his research contribution, such as 臺灣大學拔萃講座 (2023), 臺灣大學工學院學術勵進獎 (2023), Fellow of the Royal Society of Chemistry (2022), Future Tech Award of the Taiwan National Science and Technology Council (NSTC) (2021, 2022 and 2023), Ta-You Wu Memorial Award of

the Taiwan NSTC (2021), Young Scholar Fellowship of the Taiwan NSTC (2020), IEEE-NANOMED New Innovator Award (2019) and Young Investigator Award of the NTHU (2018).