

BUSINESS OPPORTUNITIES

TRIBOMETER

Automated
TriboElectricNanoGenerators
(TENGs) characterization system

An innovative automatic
equipment for TENG
mechanical and electrical
characterization.



ICN2[®]

Institut Català
de Nanociència
i Nanotecnologia

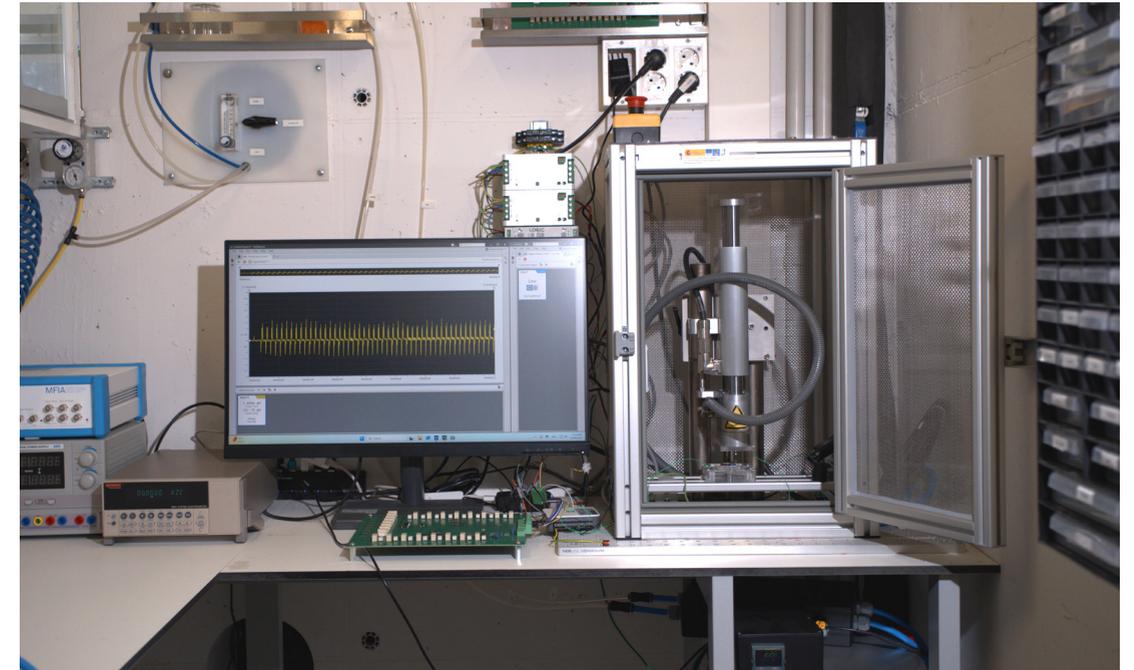
APPLICATION LANDSCAPE AND NEED

TENGs are innovative energy harvesting devices that convert mechanical energy into electrical energy using the coupling of triboelectrification and electrostatic induction. Since their invention in 2012, TENGs have gained attention due to their simple structure, low cost, high efficiency and suitability for self-powered devices and sensors.

The TENG output signal is governed by the device specifications in terms of materials stacking and design (size), but also it is strongly

affected by the ambient conditions, the actuation parameters and the electrical measurement systems, which gives rise to a big challenge when comparing and benchmarking different TENG outputs among the research community.

Thus, providing the materials science and energy community with a commercial instrument for controlled activation and for standard and versatile characterization of mechanical to electrical generators is needed.



INNOVATION

The Catalan Institute of Nanoscience and Nanotechnology (ICN2) has developed Tribometer, an innovative automatic equipment for TENG mechanical and electrical characterization.

Our invention includes an automated TENG actuator system composed of a linear motor (with environmental control) and an electrical characterization setup.

The novelty of our complete invention relies on the electronic characterization system with an automatic load switch that allows adapting the output signals to the specifications of the data acquisition tools.

With this TENG characterization set-up, researchers will be able to characterize unambiguously the performance of TENG devices over a large range of parameters, in an easy and automated way, getting materials comparisons, device characteristic figures-of-merit and their dependence with ambient and cinematic conditions.

APPLICATIONS

Wearable electronics, self-powered sensors, blue energy harvesting, Internet of Things (IoT), biomedical devices, smart cities.

KEY ADVANTAGES

Versatile set-up for controlled activation and electrical/mechanical characterization of TENGs, equipped with:

- ▶ High control motorized motion source, isolated for ambient control and long-term experiments
- ▶ Automatic smart load switch adaptable to all device voltage/current output
- ▶ Synchronization and post-acquisition processing/analysis of mechanical and electrical data

STAGE OF DEVELOPMENT

We have successfully validated individual components of the system with a variety of devices from our laboratory and other research and technological centres in Spain and in Sweden. Nowadays, we are integrating them into a more advanced prototype (more information at <https://tribomed.es>).

BUSINESS OPPORTUNITY

The ICN2 is looking for industrial partners interested in licensing the technology and/or collaborating on transitioning the lab-scale concept towards industrial-grade production.

INTELLECTUAL PROPERTY: European patent application filed May 2025 (EP25382511).



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