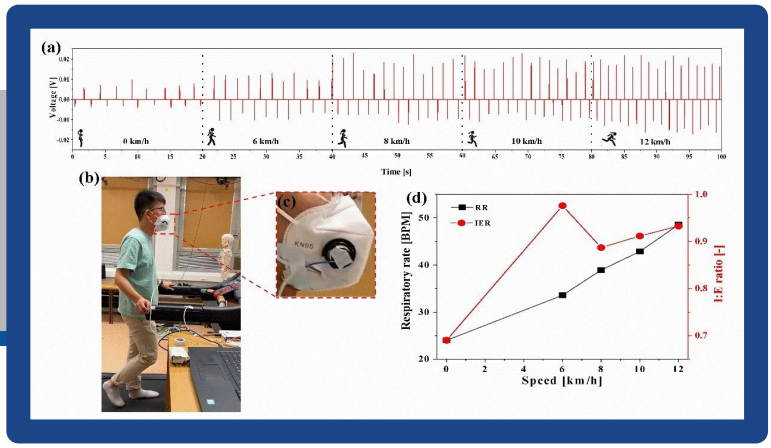
Budapest University of Technology and Economics

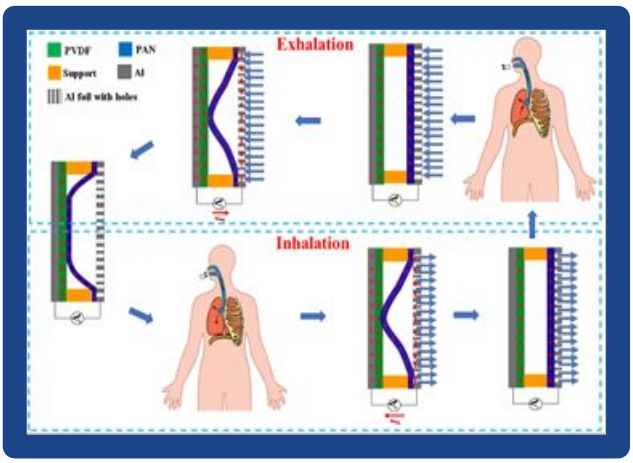
MŰEGYETEM 1782

SMART FACE MASK

BASED ON A PIEZO-ELECTRIC HYBRID NANOGENERATOR



Respiratory parameters are important indicators of respiratory diseases. These include respiratory rate (RR), inhalation time (Tin), exhalation time (Tex) and their ratio (IER=Tin/Tex). However, most breathing sensors can only detect RR, while suffering from issues of inconvenience and discomfort. Based on a piezo-triboelectric hybrid nanogenerator with nanofibrous membranes, which can convert the biomechanical energy from the breathing process to voltage output signals, our smart, self-powered mask is able to monitor the full spectrum of respiratory indices (RR, Tin, Tex, IER).



SOLUTION

In comparison with traditional micro-fibrous filters, our nanofibrous filter has higher filtration efficiency. Furthermore, it can be used to construct wearable triboelectric nanogenerators (TENGs) with increased efficiency of output voltage. Using our filter as a TENG, we are able to simultaneously monitor respiratory parameters and provide energy for an integrated Bluetooth chip for transmitting the captured data to the user's smartphone, and ultimately to a cloud-based diagnostics AI.

TRL 4 Technology validated in lab (breadboard model ready, prototype is being finalized)

SEEKING one or more industry partners to further develop the technology and for licensing purposes.

BENEFITS

- High filtration efficiency
- Excellent potential for self diagnostics
- Economic and green solution, requiring neither disposable nor rechargeable batteries

APPLICATION

- Self-powered, changeable mask filter with high filtration efficiency and capability for respiration monitoring
- Potential to be utilized both as personal protection equipment and as medical device

PUBLICATIONS HAIJUN et al.: *A smart face mask based on piezo-triboelectric hybrid nanogenerator for respiration monitoring* (manuscript)

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INTELLECTUAL PROPERTY

Priority HU patent application P2100102
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