

A Multi-Functional Flexible Ferroelectric Transistor Sensor for Electronic Skin

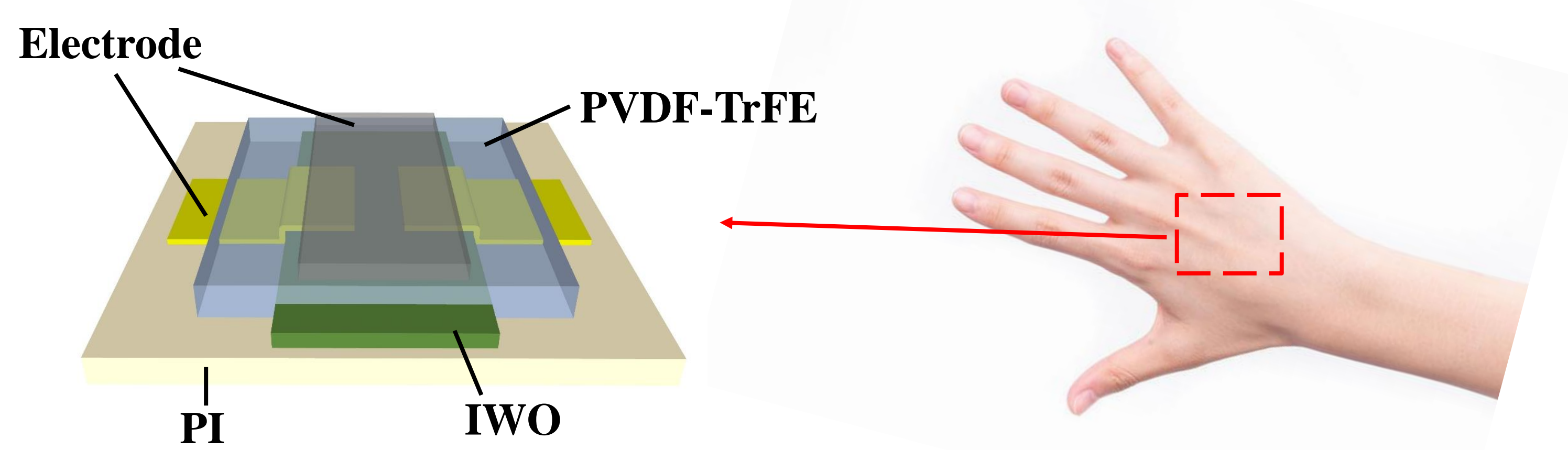
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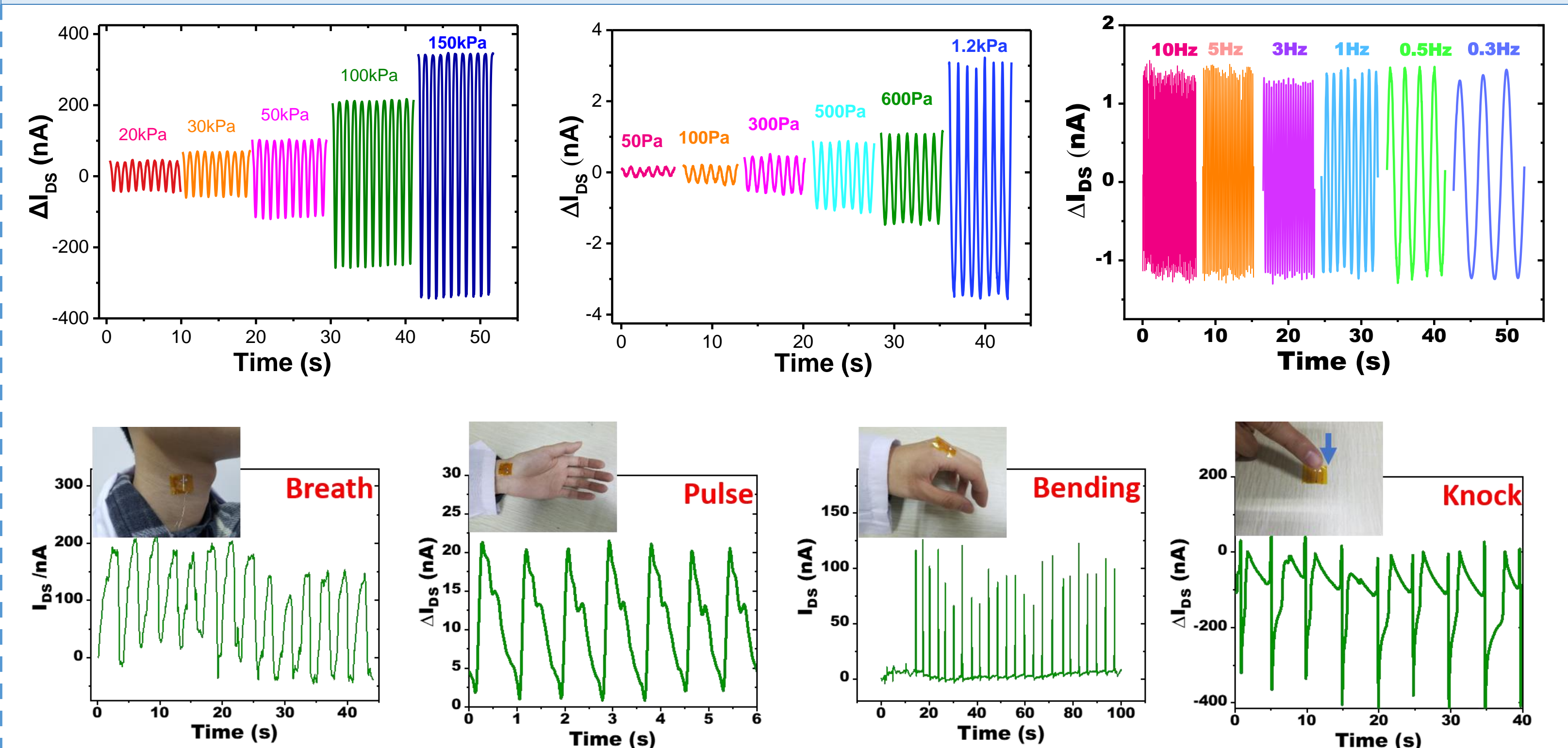
INTRODUCTION

Electronic Skin (E-skin) is a device that mimics the functions of human skin and is attracting more and more attention as a novel platform for human-machine interaction, health diagnostics, therapeutics, robotics, prosthesis and monitoring. Here a flexible ferroelectric field-effect transistor (FeFET) was developed as a multifunctional sensor prototype for electronic skin. Ferroelectric poly(vinylidene fluoride trifluoroethylene) and amorphous tungsten-doped indium oxide were utilized to construct the FeFET. The device has three sensing modes which could detect the force (strain), temperature and charge.



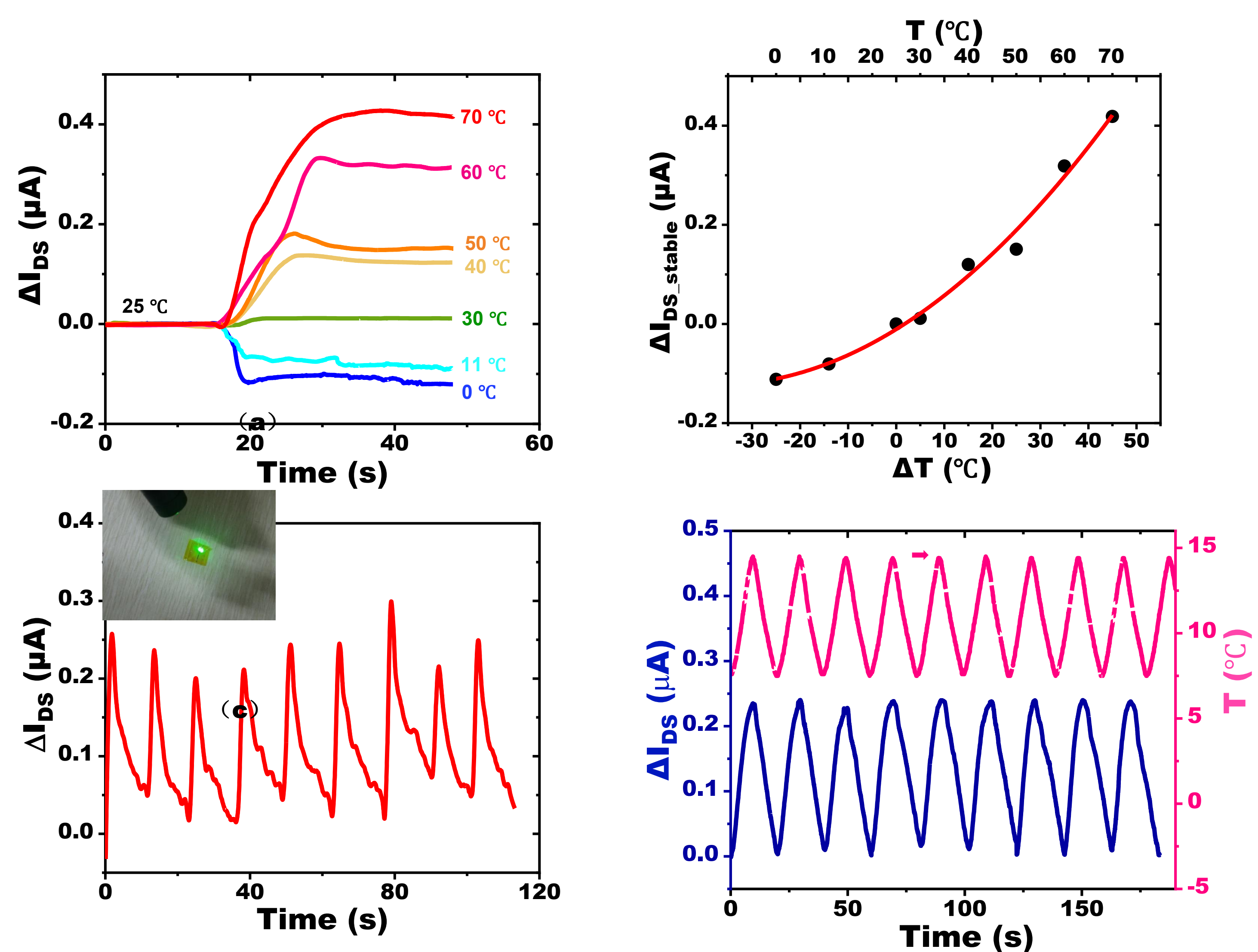
PRESSURE SENSING

The sensor could monitor external stress with a linear sensitivity of 4.6 nA/kPa in broad pressure range between 50 Pa and 150 kPa and frequency range from 0.3 Hz to 10 Hz in our experiment. By being attached to human body, it can realize health monitoring and action recognition function, such as breath, pulse and joint's bending.



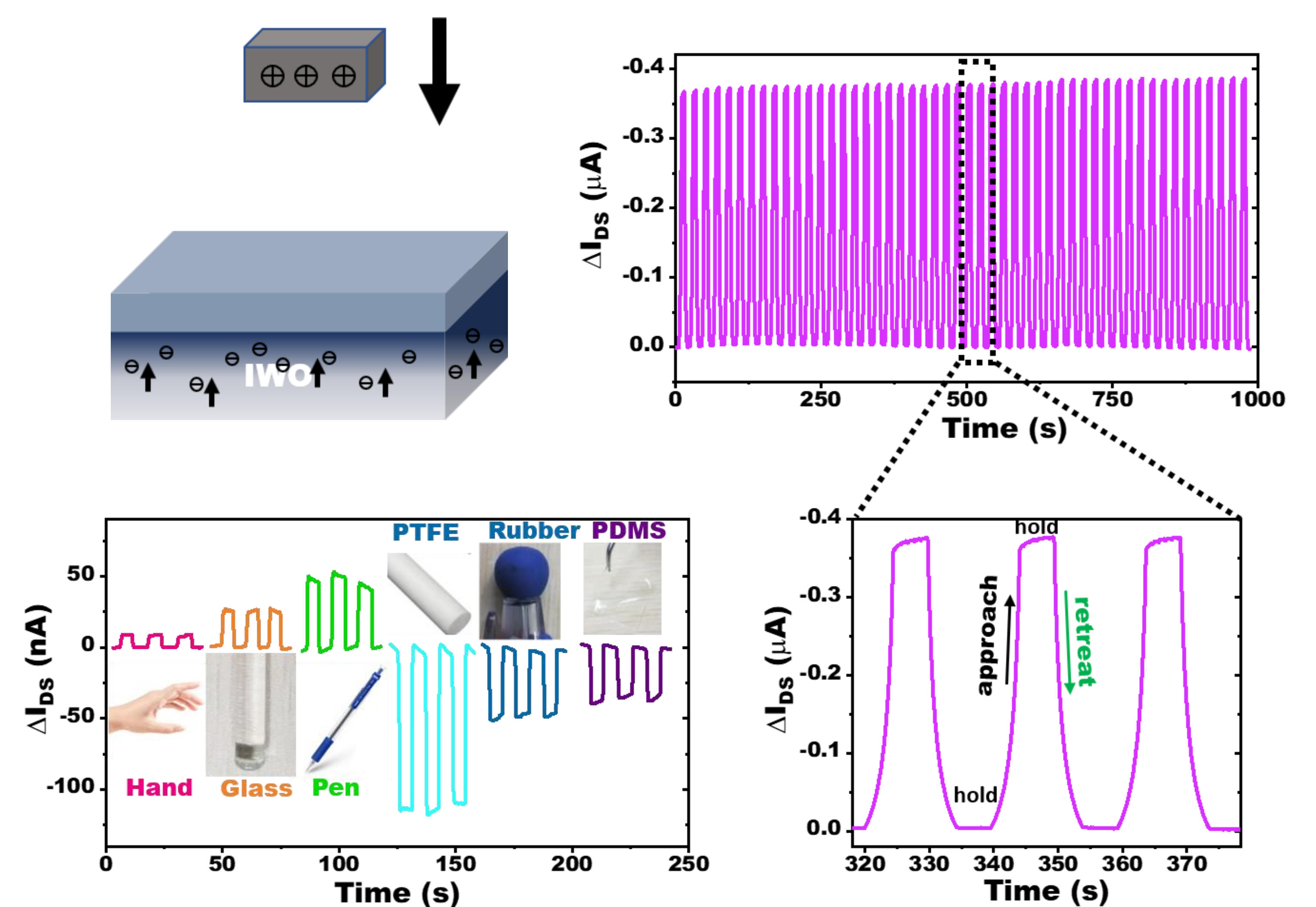
TEMPERATURE SENSING

The sensor could detect temperature from 0°C to 79 °C. Besides, it can respond to periodic change in temperature and light radiation.



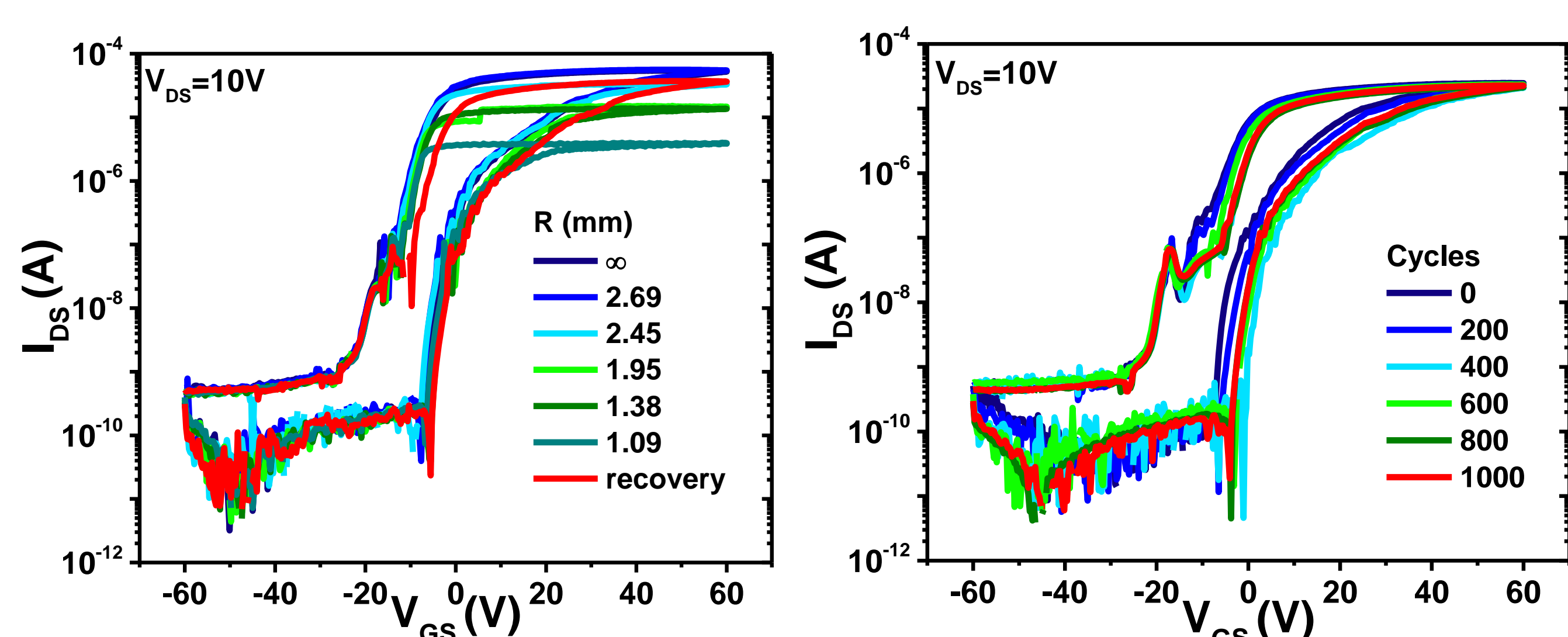
PROXIMITY SENSING

The sensor also has proximity sensing mode which could non-contactly detect charged objects, including some daily objects such as glass rod, pen and rubber.



ENDURANCE TEST

The sensor showed good bending endurance which maintained its transfer characteristic after 1000 cycles of bending operation or under strain.



ACKNOWLEDGEMENT

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