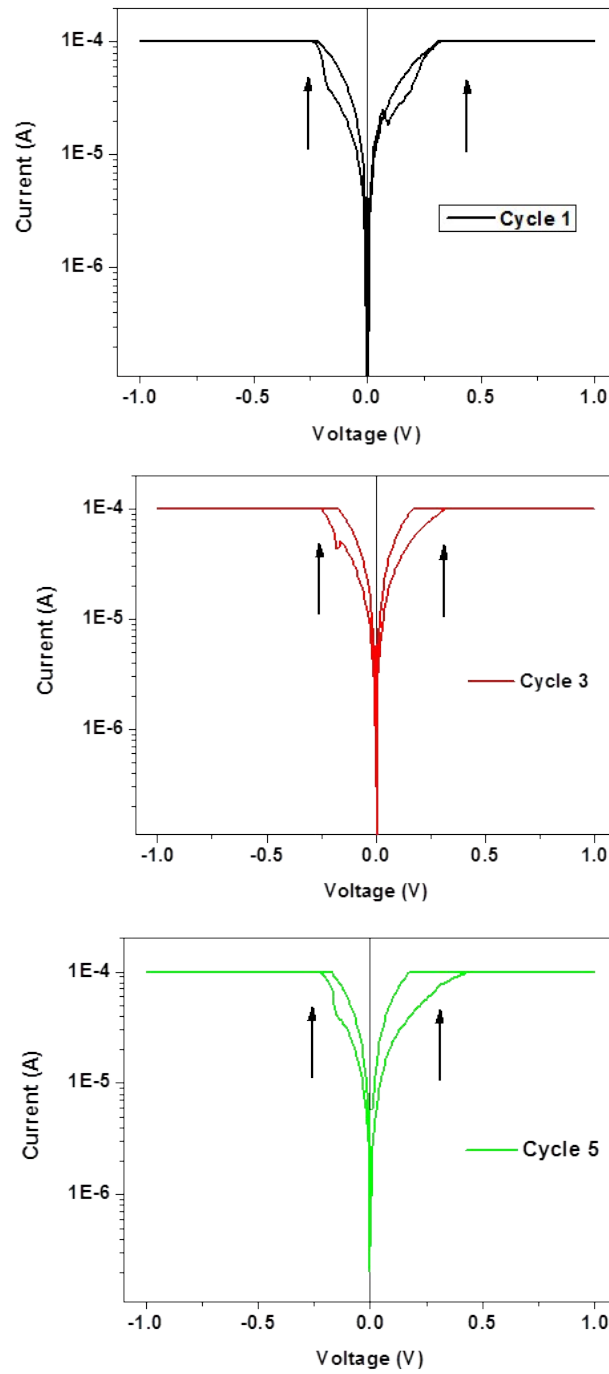


## **Ionic liquid-enhanced soft resistive switching devices**

Krishna Rajan<sup>1,2</sup>, Annalisa Chiappone<sup>1</sup>, Denis Perrone<sup>1</sup>, Sergio Bocchini<sup>1</sup>, Ignazio Roppolo<sup>1</sup>,  
Katarzyna Bejtko<sup>1</sup>, Micaela Castellino<sup>1</sup>, Candido Fabrizio Pirri<sup>1,2</sup>, Carlo Ricciardi<sup>2</sup>, Alessandro  
Chiolerio<sup>1\*</sup>

<sup>1</sup>Center for Space Human Robotics, Istituto Italiano di Tecnologia, Corso Trento 21, 10129, Torino,  
Italy.

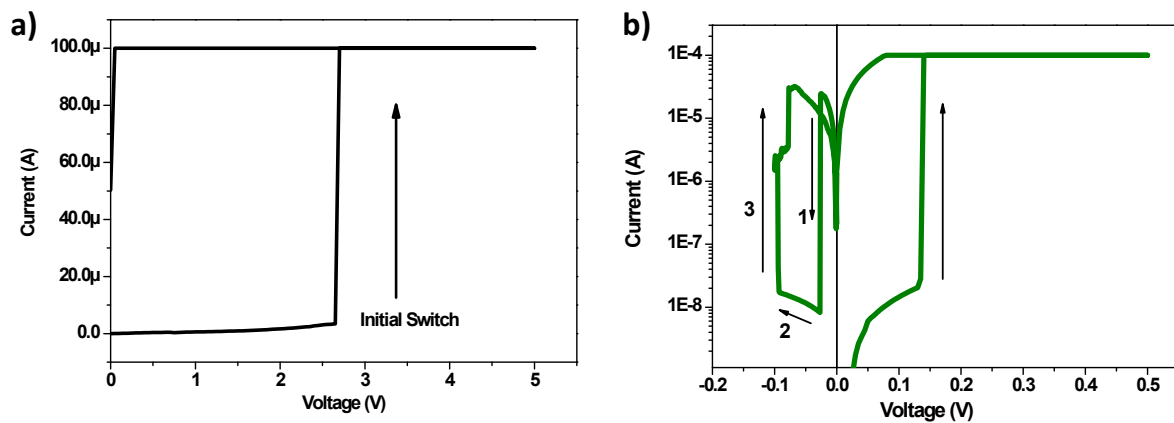
<sup>2</sup>Department of Applied Science and Technology, Politecnico Di Torino, C.so Duca degli Abruzzi  
24, 10129 Torino, Italy.



**Fig S1.** Cyclic I-V measured in the Au/PAG-IL/Au planar structure after initial threshold switching.

The above measurements were carried out by setting a current compliance level of 100  $\mu$ A in both positive and negative sweep. After the electroforming process that took place around -2.2 V, further electrical measurements were carried out in the device. Continuous I-V sweeps were applied and it

was observed that the absolute value of set voltage was reduced by increasing the number of cycles. Even though the device characteristic was becoming more and more shrunk, the loop always had symmetric behavior in both polarities confirming its volatile nature. This continuous shrinkage in the I-V loop confirms the presence of an unstable filament between the electrodes.



**Fig. S2:** Electrical measurement performed on the planar device with PAG-IL at 70 °C . a) Initial switching of device. b) Cyclic measurement performed on the device.

Fig. S2 provides the experimental results of the electrically characterised device at higher temperature range (70 °C as this is the commercial upper temperature usually accepted for standards), a pristine device was found to switch initially at 2.65 V (**new Fig. S2a**), value which is comparable to the initial switching of the device at R.T.. The switching behaviour is also similar to that of devices tested at R.T.. As it can be seen from **Fig. S2b** after forming the device sets at a reduced voltage level of 0.135 V. The reset behaviour was not stable. In the negative bias the device resets at -0.026 V and then is not able to maintain this state, at -0.093 V the device again sets.