## **SUPPORTING INFORMATION**

# Synergistic Effect of *r*-GO/PANI Nanocomposite Electrode based Air Working Ionic Actuator with Large Actuation Stroke and Long-Term Durability

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### S1 Morphology characterization of bimorph actuators

The cross-sectional view of the assembled *r*-GO, PANI and *r*-GO/PANI actuators are shown in Figure S1. It can be seen, a bimorph configuration with thickness of about 250  $\mu$ m was formed, in which electrode and electrolyte layers were combined together tightly.



Figure S1 Cross-sectional SEM characterization of (a) r-GO, (b) PANI and (c) r-GO/PANI bimorph actuators.

## S2. Actuation performance of *r*-GO/PANI actuator under a 0.5 V, 0.01 Hz voltage.



Figure S2 Bending deformation of r-GO/PANI ionic actuator under a 0.5 V, 0.01 Hz voltage.

### S3 Morphology characterization of *r*-GO/PANI sheets.

The morphology of *r*-GO/PANI sheets with different PANI content was characterized and the results are given in Figure S3.



Figure S3 SEM characterization of (a) r-GO/PANI (50/50) and (b) r-GO/PANI (20/80) sheet.

#### **S4. EIS characterization fitting results.**

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	$R_0/\Omega$	$R_1/\Omega$	Q1/Fs <sup>n-1</sup>	n	$R_2/\Omega$	Q <sub>2</sub> / F	$Z_w/\Omega$
r-GO	276	657	4.86e-3	0.3923	6811	22.4e-3	0.1178
PANI	317	3470	4.43e-11	0.9705	87.6	11.4e-3	0.0178
<i>r-</i> GO/PANI	142	282	48.3e-3	0.325	1117	324.6e-3	0.0664

Table S1 Fitting results of the EIS data for various actuators.