

Magnetically tuneable piezoresistive sensor for direct, *in situ* strain measurement in Li-ion batteries

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Supplementary Information

Ohmic response of the PRM sample

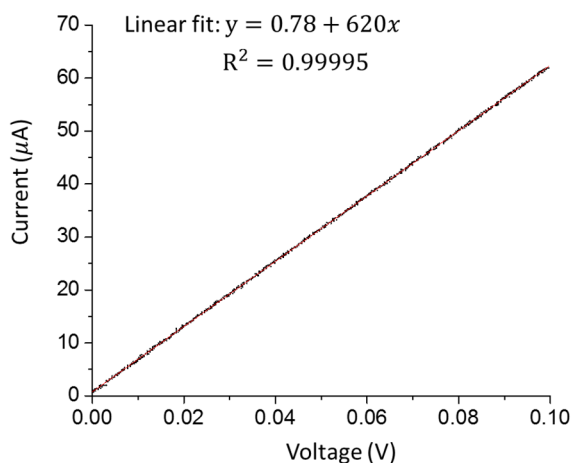


Fig. S1 I-V curve of the c-PRM sample with 33 wt % Ni under zero strain. The PRM had been infiltrated with 1 M LiClO₄/EC + PC electrolyte prior to the experiment. Black dots are the data and the red line is the linear fit to the data.

Gauge Factor calculation

Gauge factor, Γ , was calculated using the equation¹:

$$\Gamma = -G(1 - 2\nu) - (1 + 2\nu)$$

Where ν is Poisson's ratio (~ 0.35 for polymer composites) and G is the slope of the plots below.

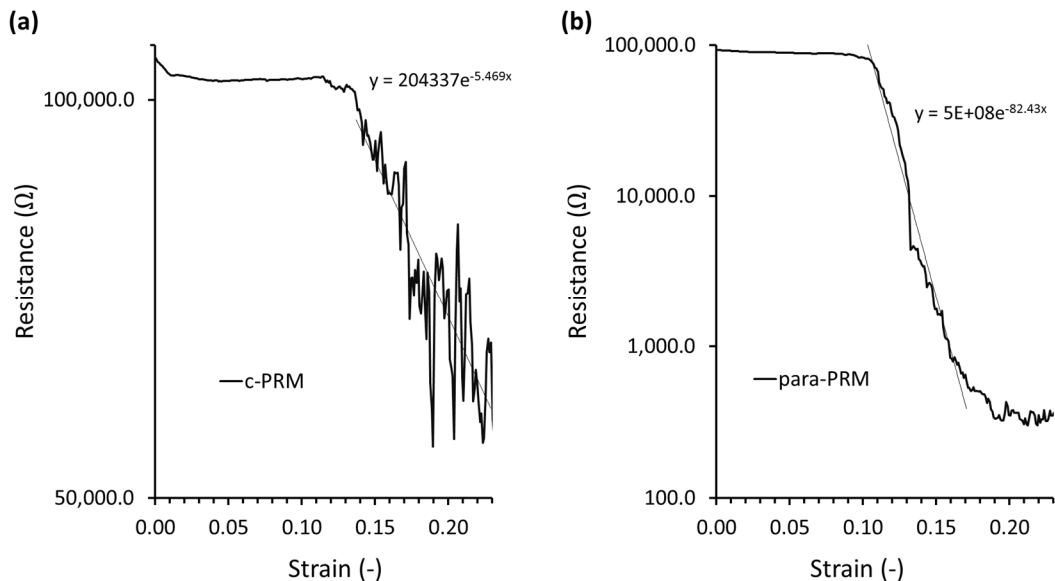


Fig. S2 Logarithm of resistance versus the strain. The dotted lines are fitted linear lines used to calculate the G value.

X-ray diffraction of Sn before and after lithiation

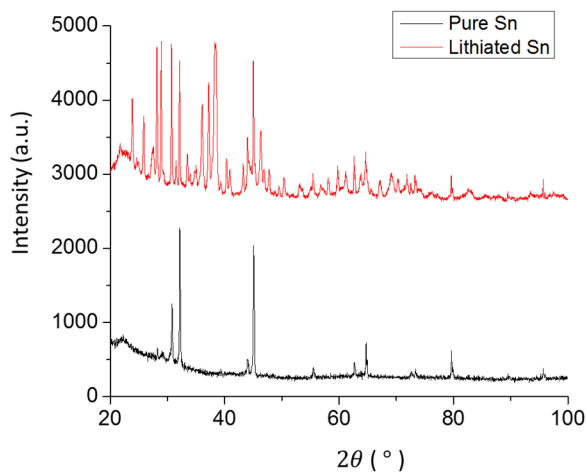


Fig. S3 X-ray diffraction data of the 2-mm thick Sn foil (a) before and (b) after lithiation to 0.01 V. The Sn was lithiated at 0.5 mA/g Sn using Li counter electrode and 1 M $\text{LiClO}_4/\text{EC} + \text{PC}$ electrolyte. Data comparison with JCPDS cards indicate that additional peaks in lithiated Sn can be attributed to multiple Li_xSn_y phases.

Reference

- 1 M. K. Abyaneh and S. K. Kulkarni, *J. Phys. D: Appl. Phys.*, 2008, **41**, 135405/135401-135405/135407.