Electronic Supplementary Information - ESI

Nanoscale Phase Separation in Laponite/Polypyrrole Nanocomposites. Application to Electrodes for Energy Storage

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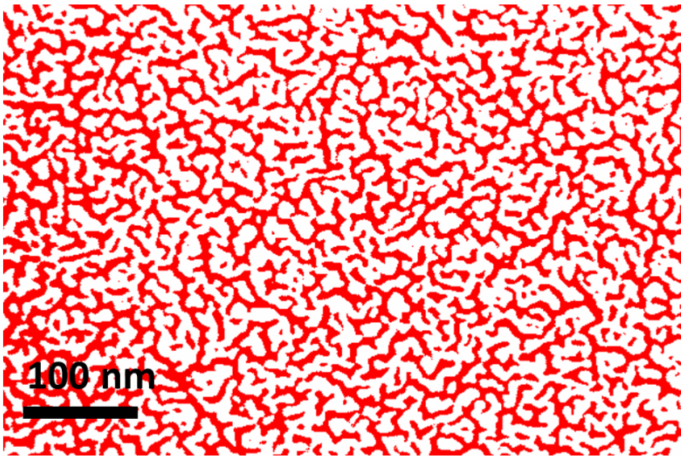
Figure ESI 1. Film mass determination from SEM micrograph: a) SEM image using Energy selective Backscattered (*EsB*) *detector*. Image was thresholded by ImageJ software to create binary images, polymer (red) and Laponite rich-areas (white). b) Surface analysis.

a)



b)

Threshold: 0-128

Count: 267

Total Area: 94044.000 pixel^2

Average Size: 352.225 pixel^2

Area Fraction: 39.2%

If we assume a uniform film, the film mass can be calculated according to the following equation:

$$m = S * t * \{\phi * \rho_{Polyrrole} + (1 - \phi) * \rho_{Laponite}\}$$

where S and t were the area and the thickness, ϕ the final volume fraction of polypyrrole inside the film, and ρ is the density. Density's values are: 1.54 g cm^{-3} for polypyrrole[1] and 2.54 gcm^{-3} for Laponite.

[1]Aldissi M (ed) (1992) Intrinsically conducting polymers: an emerging technology. Kluwer Academic Publishers, Dordrecht

Figure ESI 2 **(a) STEM micrograph obtained on thin film areas prepared on a Ni-TEM grid. Notice the T-type bonding between the laponite particles, e.g. readily visible in the center of the micrographSEM. Micrograph using Energy selective Backscattered (*EsB*) *detector* of Lp-PPy-10% nanocomposite film: *(b) T*op view; (c) Cross section;**

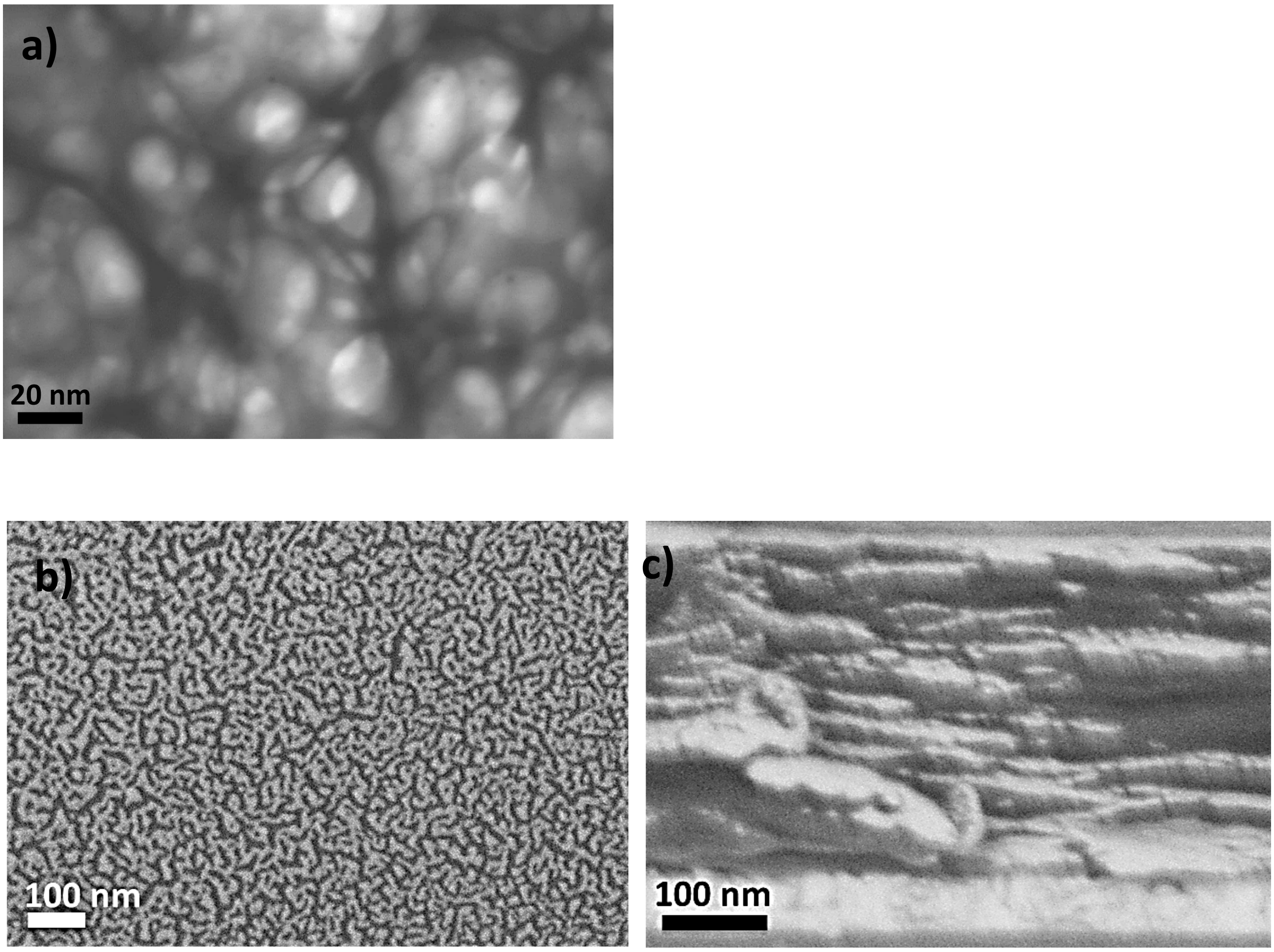
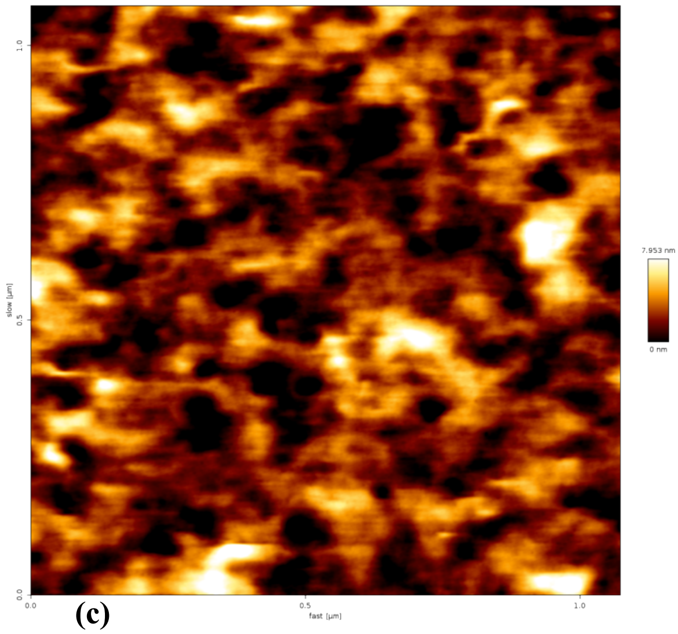
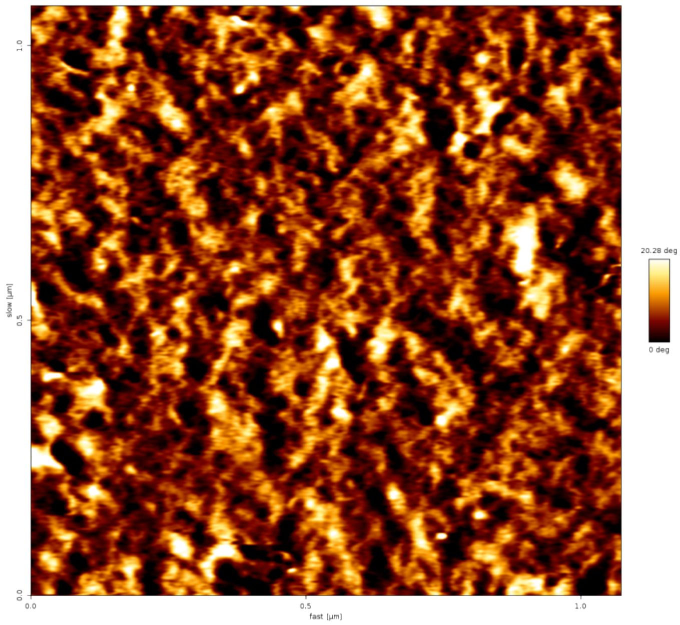


Figure ESI 3. AFM images of Lp-PPy-10% nanocomposite film using the force modulation modus: (a) height, and (b) amplitude and (c) phase. All scans are 1x1µm^2. Notice the meandering polymer phase (dark areas in b and c).

(a)



(b)



(c)

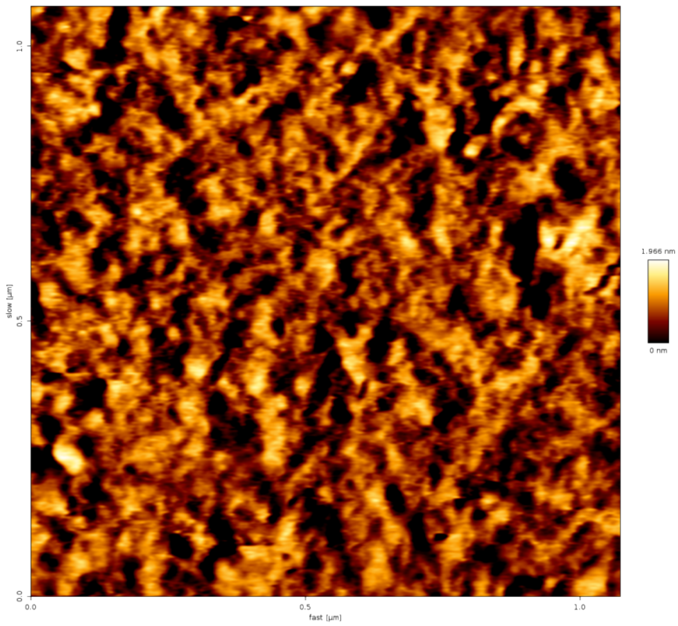
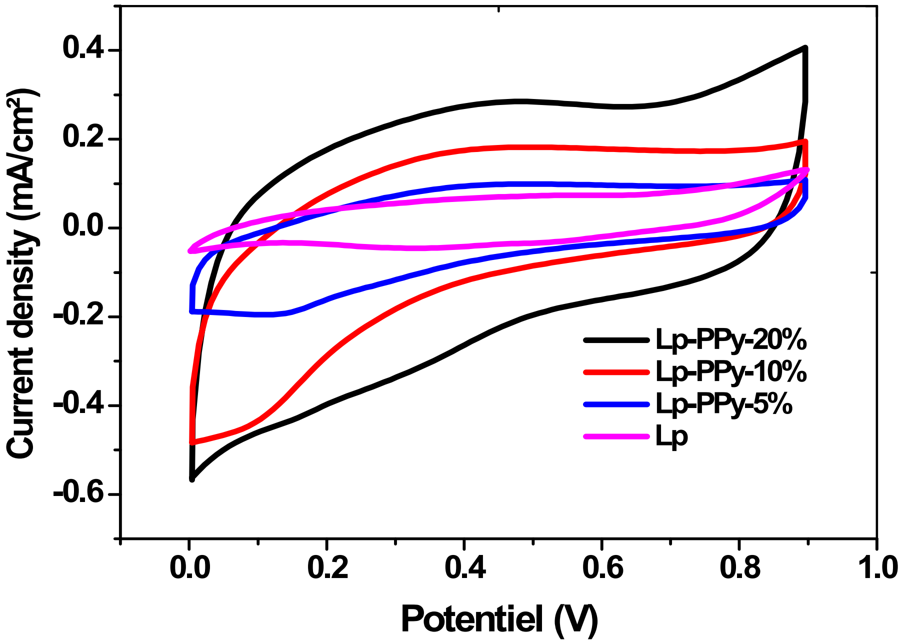


Figure ESI 4. (a) CVs of Lp-PPy nanocomposite electrodes at 50mV scan rate; (b) The charge–discharge curves at 3Ag^{-1}.

(a)



(b)

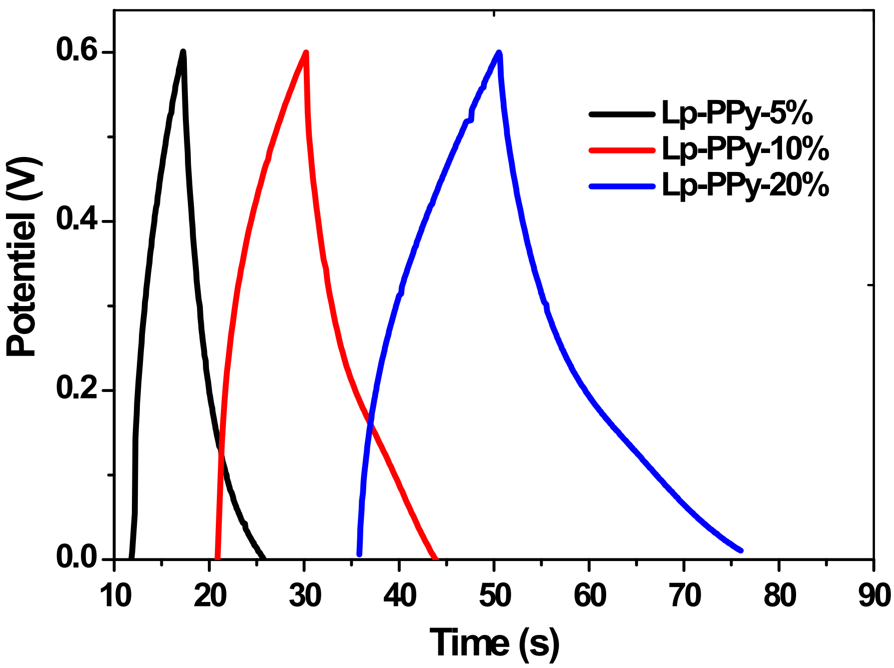


Figure ESI 5. Long-term cycling test (500 cycles) at a current density of 5 A/g for: (a)Lp film and (b) Lp-PPy-10% nanocomposite film.