Supporting information

Unusually high stability of poly(dimethyldioctylquaterthiophene-*alt*-oxadiazole) conjugated copolymer in its n and p-doped states

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1. *Calculation of the doping level*

The determination of the mass of the polymer deposited on the electrode used for cyclic voltammetry experiments was not possible because of its extremely small value. To determine this mass we used an electrode of 6 fold larger surface area (0.6 cm^2) as compared to that used for CV. The polymer was deposited in strictly identical conditions, as for the CV studies i.e; with 6 fold higher current, in the same time period. As expected, the charge used for the reduction of the as prepared polymer to the neutral state was 6 times higher than that consumed for the reduction of the film for the CV studies. This means that in both processes Faradaic efficiency was the same. The reduced polymer was repeatedly washed with acetonitrile and dried in vacuum. Then its mass (34 µg) was determined with the accuracy +- 5%. The mass of the films deposited for cv experiments was assumed to be 6 times smaller. All doping levels were calculated using this mass and the amount of the redox charge used for the doping/undoping of the polymer in the CV experiments.

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2. Impedance spectroscopy investigations of the n-doped polymer.

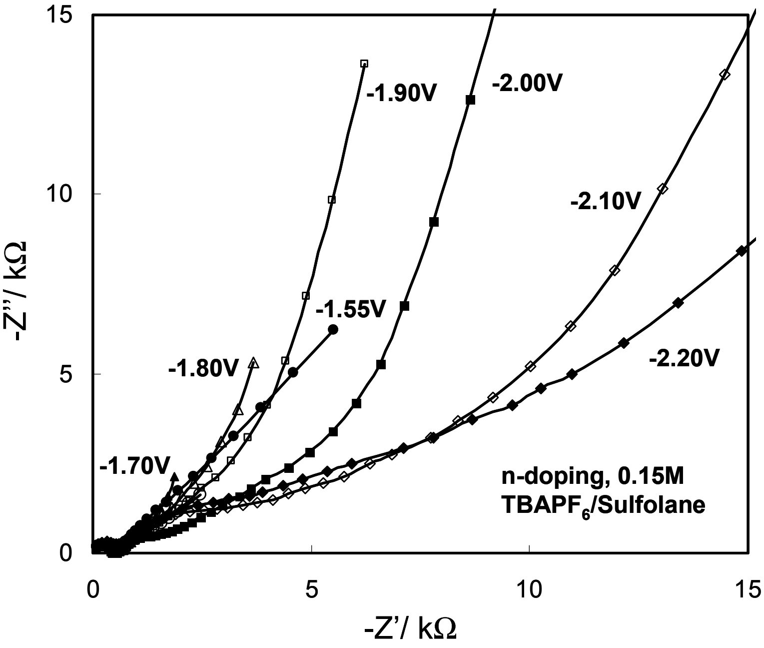

Fig1. Representative Nyquist plots of PMOThOD recorded at different potentials

The EI spectra have been recorded within the whole potential range of the n-doping and were highly reproducible. The impedance spectra were recorded with AC voltage of 5 mV in the frequency range from 160 kHz to 50 mHz. A good agreement between the shape of the CV curve for the n-doping potential range (Fig.1) and the low frequency part of the impedance spectrum can be noticed. In addition, from the medium frequency domain conclusions concerning the interfacial kinetics of charge transfer and the diffusion of mobile carriers can be drawn. It follows that the n doping process is slower as compared to the p-doping one.

It should be noted that all impedance experiments require long measuring times and to the best of our knowledge no impedance characteristic of n-doped polymers covering the whole doping potential range ever been reported.

2. Faradaic efficiency.

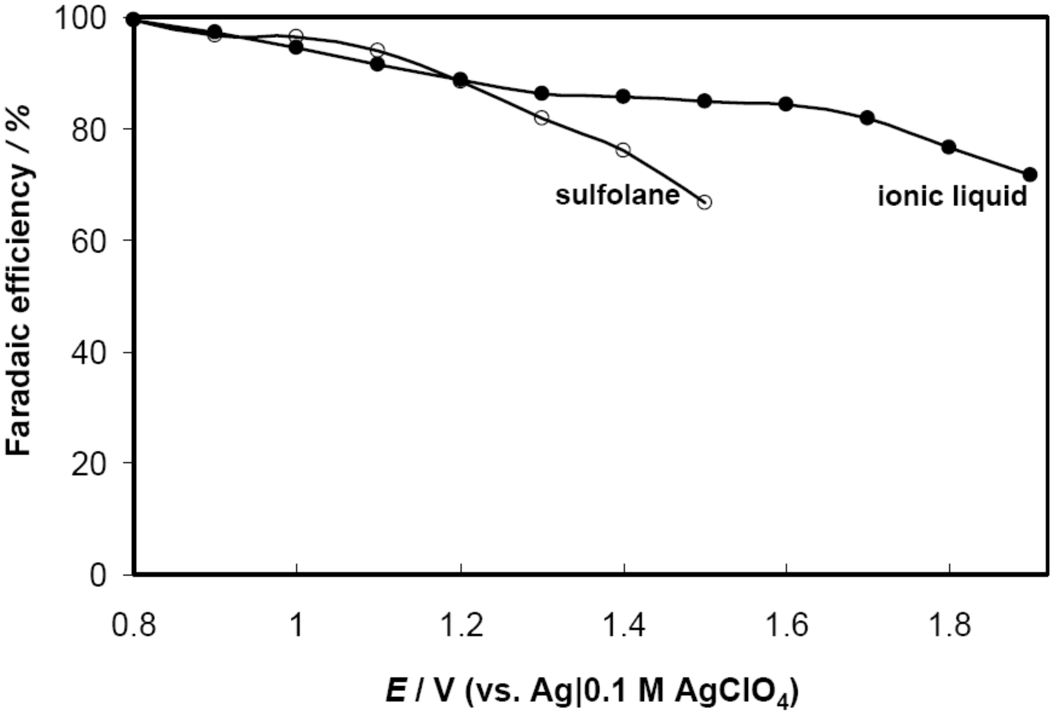

Fig2. Faradaic efficiency as a function of potential in sulfolane and ionic liquid media for p-doping of PMOThOD.