

Nanostructure-Dependent Electrical Conductivity Model Within the Framework of the Generalized Effective Medium Theory Applied to Poly(3-hexyl)thiophene Thin Films

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1. Summary of films preparation conditions

Table S1. Summary of films preparation conditions.

Solution Concentration	Substrate Type	Spin Speeds (rpm)	Spin Time	Spinning rea	Initial Heating	Electrode Application	Final Heating
20 mg/mL	Glass	750,1000 1250,1500 3000,4500	60 s	3 s	120°C, 5 min	Silver paste	65°C, 5 min
40 mg/ml	Glass	1250,1500 1575,1725 2000,3500, 5000,7000	60 s	3 s	120°C, 5 min	Silver paste	65°C, 5 min
30 mg/ml	Glass	750,1000 1500,1750 2000,3000	60 s	3 s	120°C, 5 min	_____	_____
10 mg/ml	Glass	500,750 1000,1500 2000	60 s	3 s	120°C, 5 min	_____	_____

2. XRD patterns for films deposited from solutions with concentrations of 10 and 30 mg/ml

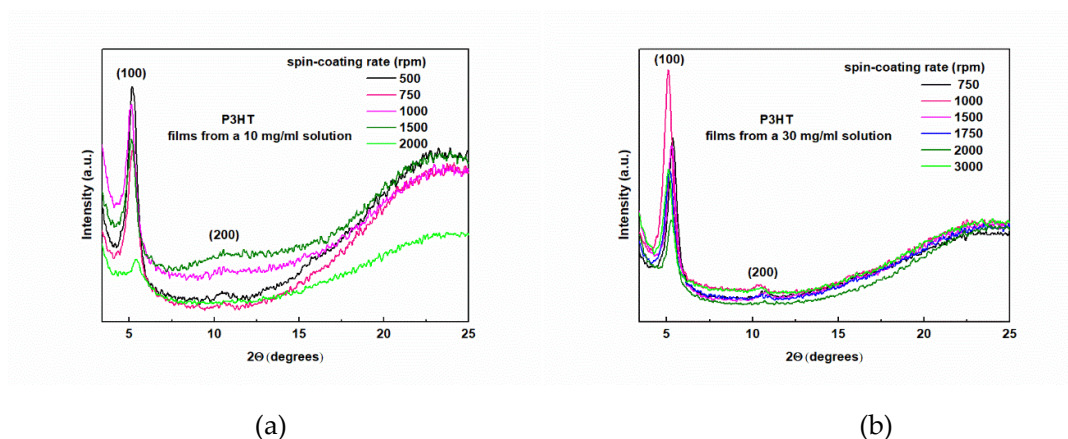


Figure S1. XRD patterns of P3HT films deposited from solutions with concentrations: (a) of 10 mg/mL and (b) 30 mg/mL solution concentration with indicated spin-coating rates.

3. 3D surface AFM images of P3HT films deposited with different spin-coating rates

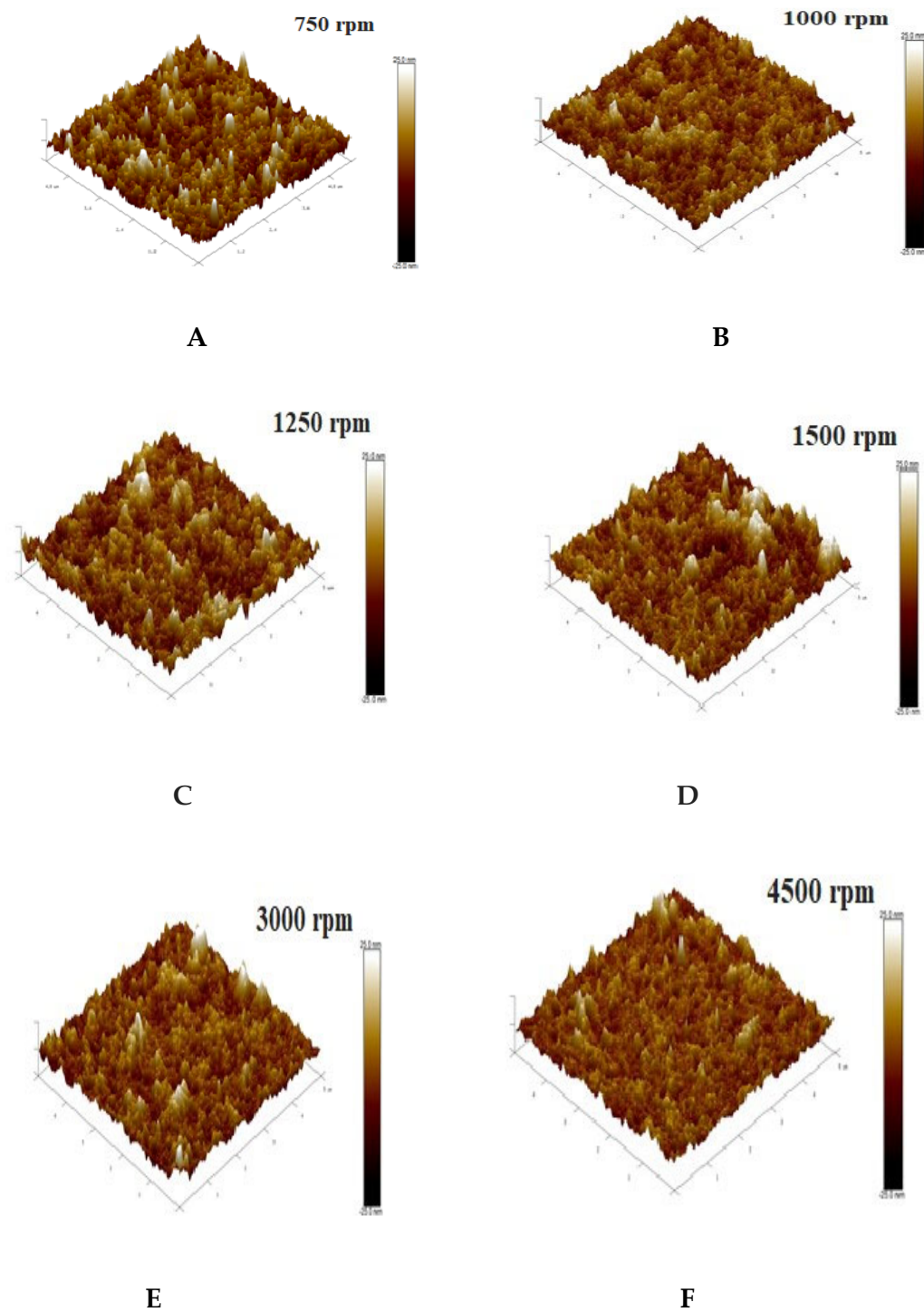
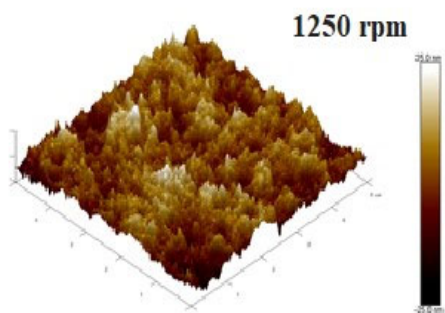
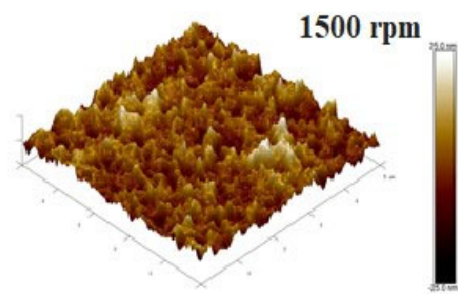


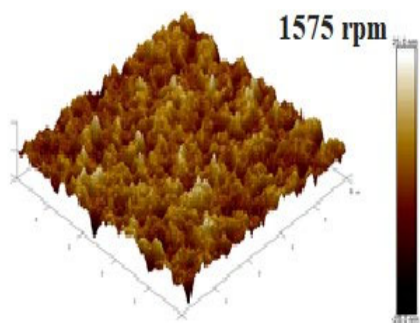
Figure S2. 3D surface AFM images of P3HT films deposited with indicated spin-coating rates from 20 mg/ml solution.



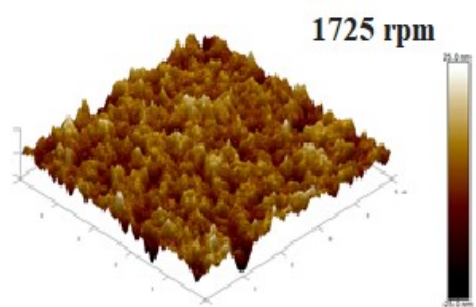
A



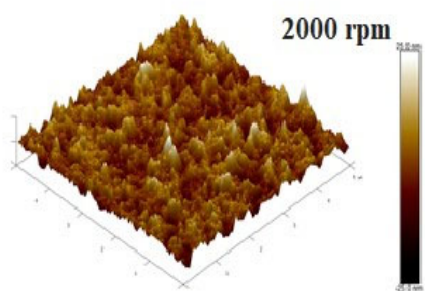
B



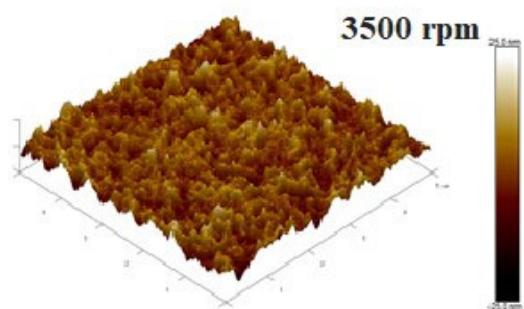
C



D



E



F

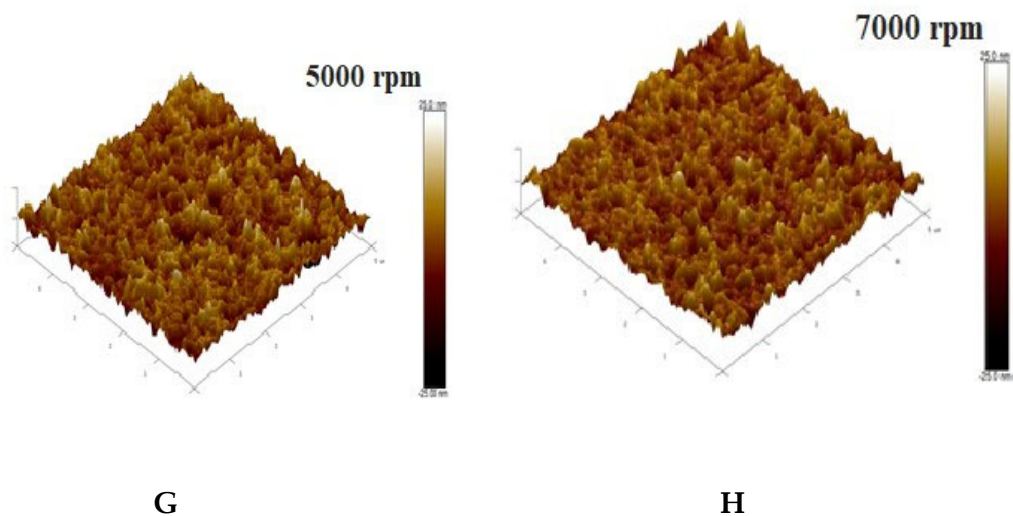


Figure S3. 3D surface AFM images of P3HT films deposited with indicated spin-coating rates from 40 mg/ml solution.

4. Results from AFM surface images analysis

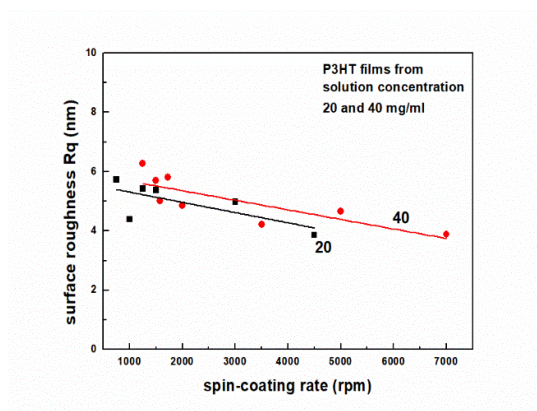


Figure S4. Surface roughness parameter R_q , as a function of spin coating rate.

5. Raw data from optical transmittance measurements

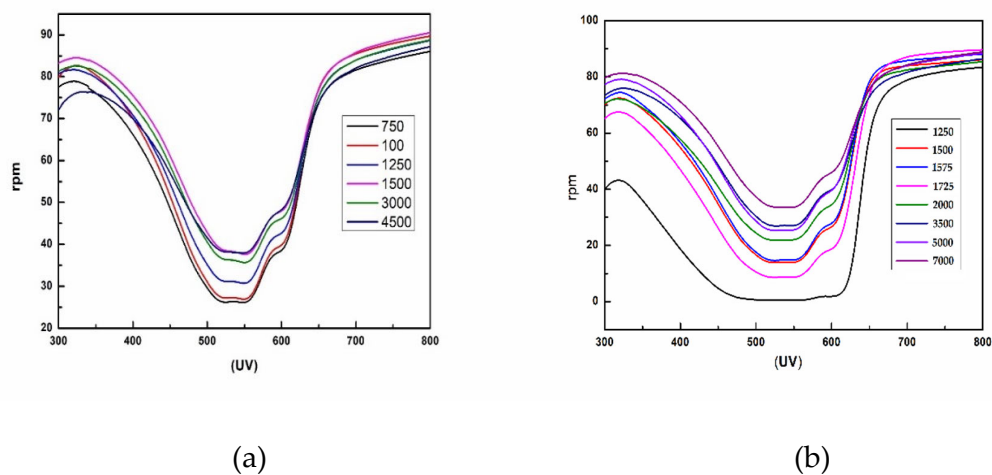


Figure S5. The transmittance of the studied films deposited from solutions with concentrations of: (a) 20 mg/mL and (b) 40 mg/mL.

6. Normalized absorption spectra of studied P3HT films

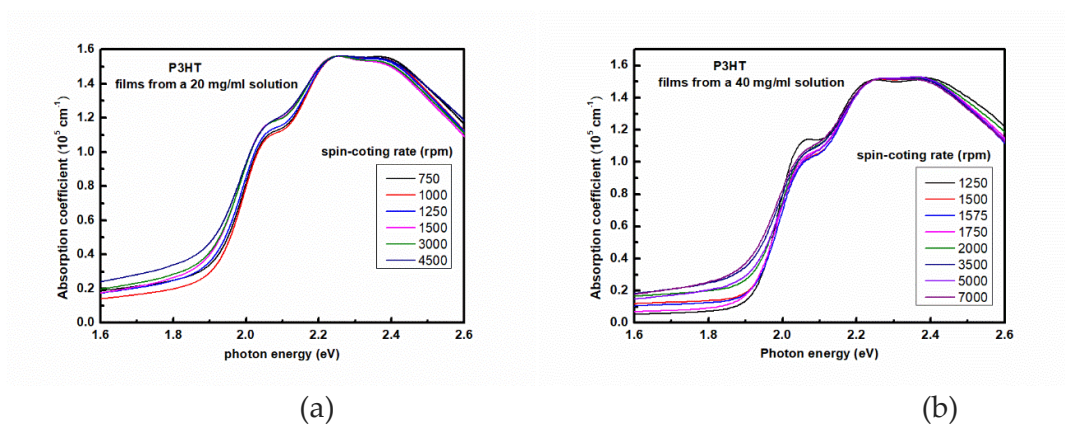


Figure S6. Normalized absorption spectra of P3HT thin films deposited from: (a) 20 mg/mL and (b) 40 mg/mL solution concentration with indicated spin-coating rates.

7. Details of the number of molecules, N, forming the aggregate determination

$$\begin{aligned} \left(\frac{0.106}{0.116}\right)^2 &= 0.835 & \frac{25+1}{30+1} &= 0.839 \\ \left(\frac{0.106}{0.117}\right)^2 &= 0.821 & \frac{24.5+1}{30+1} &= 0.823 \\ \left(\frac{0.106}{0.118}\right)^2 &= 0.807 & \frac{24+1}{30+1} &= 0.806 \\ \left(\frac{0.106}{0.112}\right)^2 &= 0.896 & \frac{27+1}{30+1} &= 0.903 \\ \left(\frac{0.116}{0.118}\right)^2 &= 0.966 & \frac{24+1}{25+1} &= 0.962 \\ \left(\frac{0.112}{0.118}\right)^2 &= 0.901 & \frac{24+1}{27+1} &= 0.893 \\ \left(\frac{0.106}{0.12}\right)^2 &= 0.78 & \frac{23+1}{30+1} &= 0.774 \\ \left(\frac{0.113}{0.115}\right)^2 &= 0.966 & \frac{25+1}{26+1} &= 0.963 \end{aligned}$$

$$\begin{aligned} \left(\frac{0.113}{0.117}\right)^2 &= 0.933 & \frac{24.5+1}{26+1} &= 0.944 \\ \left(\frac{0.113}{0.124}\right)^2 &= 0.83 & \frac{21+1}{26+1} &= 0.815 \\ \left(\frac{0.113}{0.118}\right)^2 &= 0.917 & \frac{24+1}{26+1} &= 0.926 \end{aligned}$$

$$0.106 \cdot \frac{1}{\sqrt{\frac{3}{2 \cdot (30+1)}}} = 0.482$$