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Title: A Novel Highly Sensitive Humidity Sensor Based on Poly(Pyrrole-*CO*-Formyl Pyrrole) Copolymer Film: AC and DC Impedance Analysis

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Highlights

- Nano domains surface of P (Py-co-FPy) ultra-thin film is successfully obtained via spin-coating.
- Highly sensitive with changing impedance of 5461 times at frequency 100 Hz form the changing RH value 11 to 97 %.
- Rapid response against the changing RH from 30 to 70% within 5 second.
- The logarithm model of impedance response against humidity varied linearly with $R^2 = 0.9938$ (from 11 to 97 %RH).
- Highly sensing film is obtained with small hysteresis and can be improved by tuning the film thickness.

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