

Preparation and characterization of ladder-type PEDOT-PEG PU gel polymer electrolyte

Chanhyuk Jee, Minjeong Park and PilHo Huh*

Advanced Photo/Electric laboratory of Polymer science and Engineering
Pusan national University

Abstract

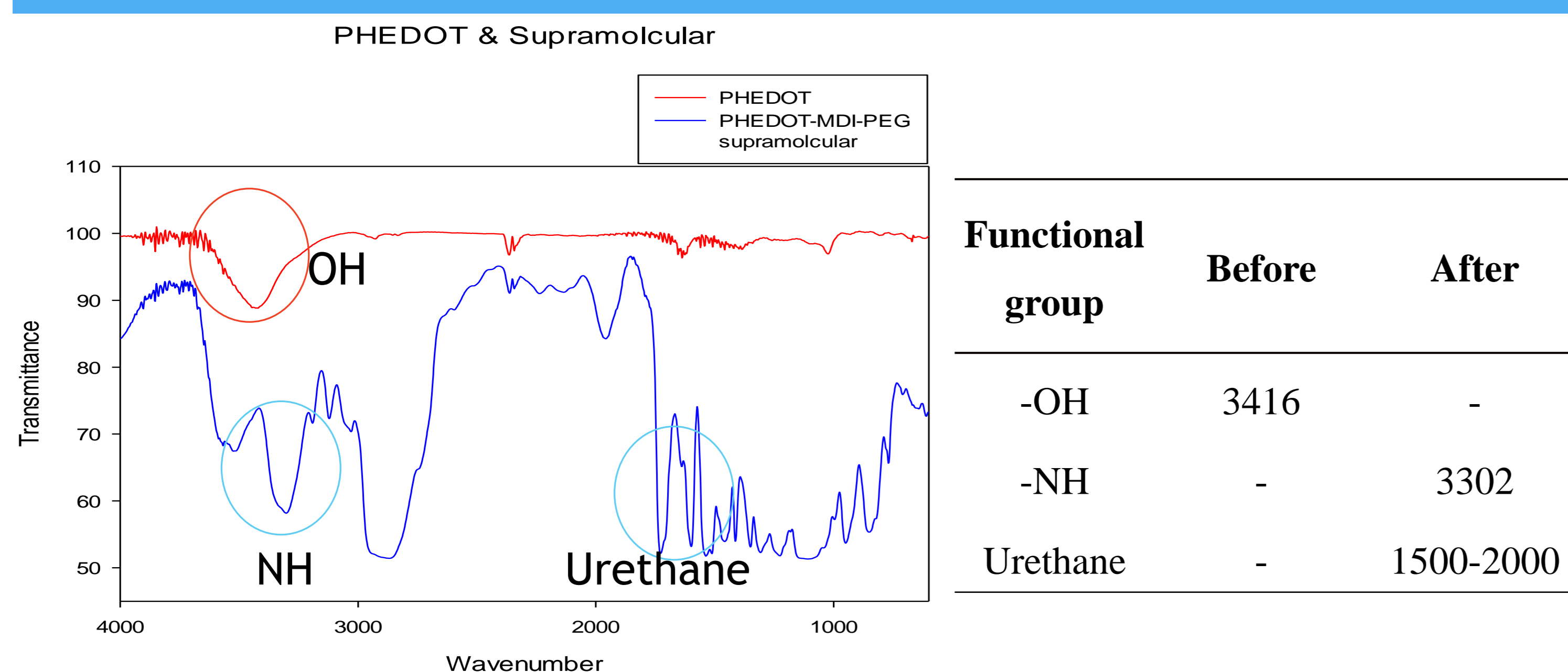
PEG was a chemically bonded to the hydroxyl groups of the conjugated PEDOT-OH to form the ladder type structure. PEDOT-OH was used as a new synthetic metal material for the mainframe
Dependent upon the doping -level by acid as HCl and HNO₃, the optical and electrical properties of the ladder-type PEDOT-PEG PU gel polymer electrolytes were evaluated. Their ionic conductivities were investigated as a function of LiClO₄ concentration and compared to that of individual PEG/LiClO₄ ratio.

Objectives

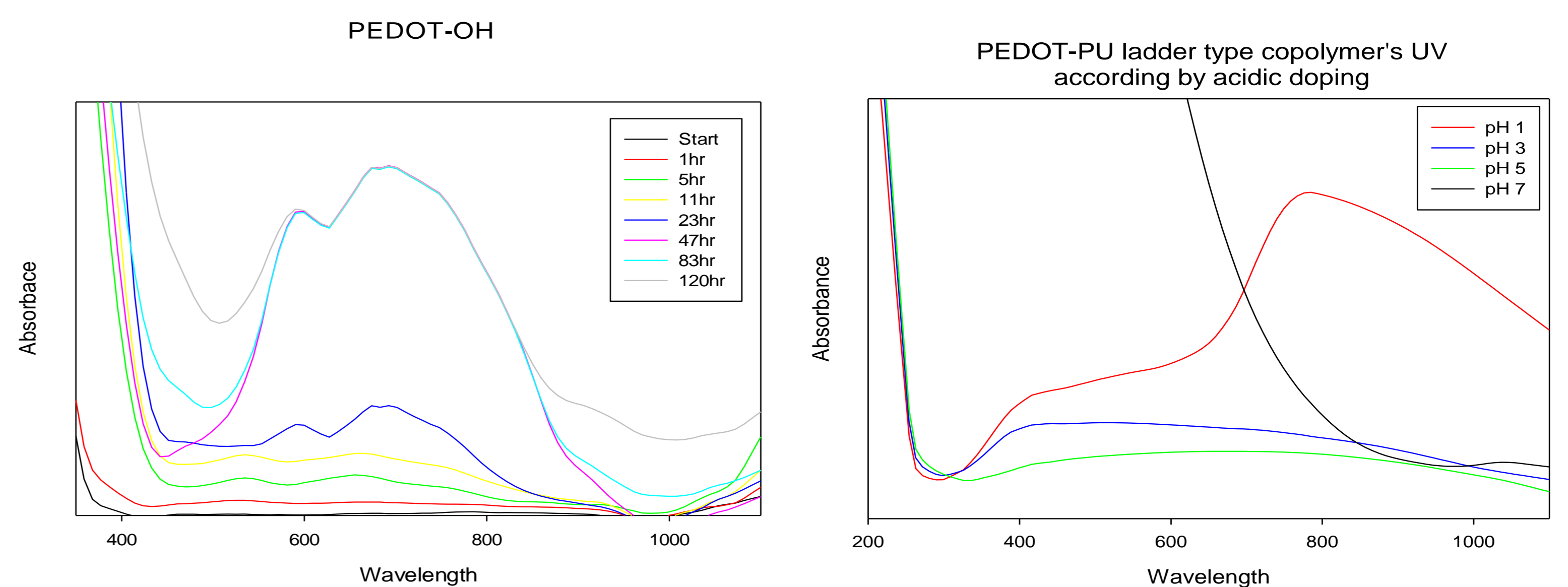
1. To synthesis the ladder-type PEDOT-PEG PU network.
2. To measure the optical and electrical properties of PEDOT-PEG PU network.
3. To compare and analyze ionic conductivities of ladder PEDOT-PEG PU gel polymer electrolytes based on [O]/[Li+] ratios and pH.
4. The optimized a ratio of [O]:[Li+] and a pH-level to form an effective PEDOT-PEG PU gel polymer electrolyte.

Results

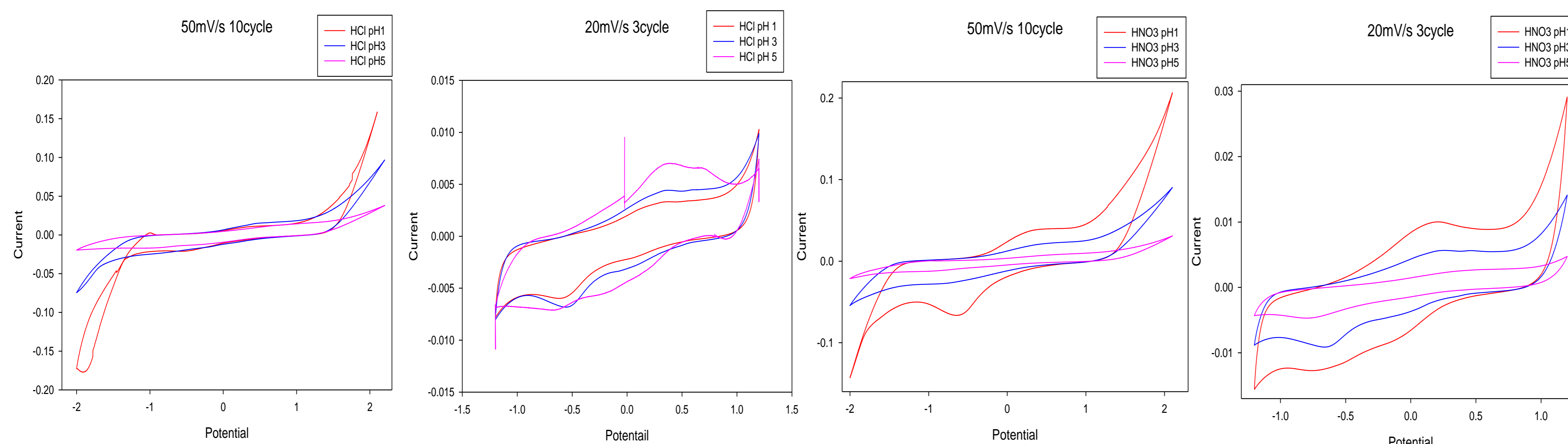
FT-IR



UV



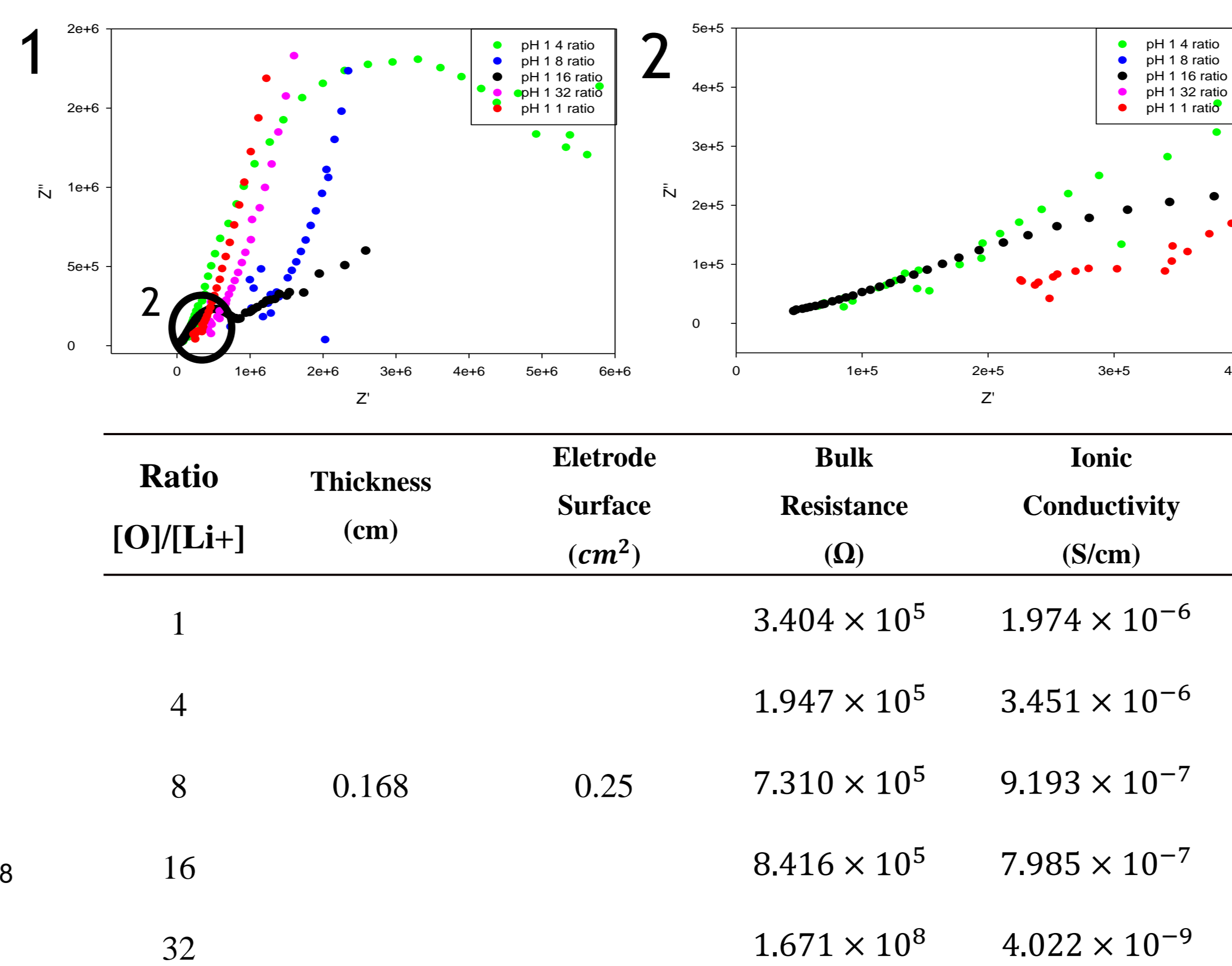
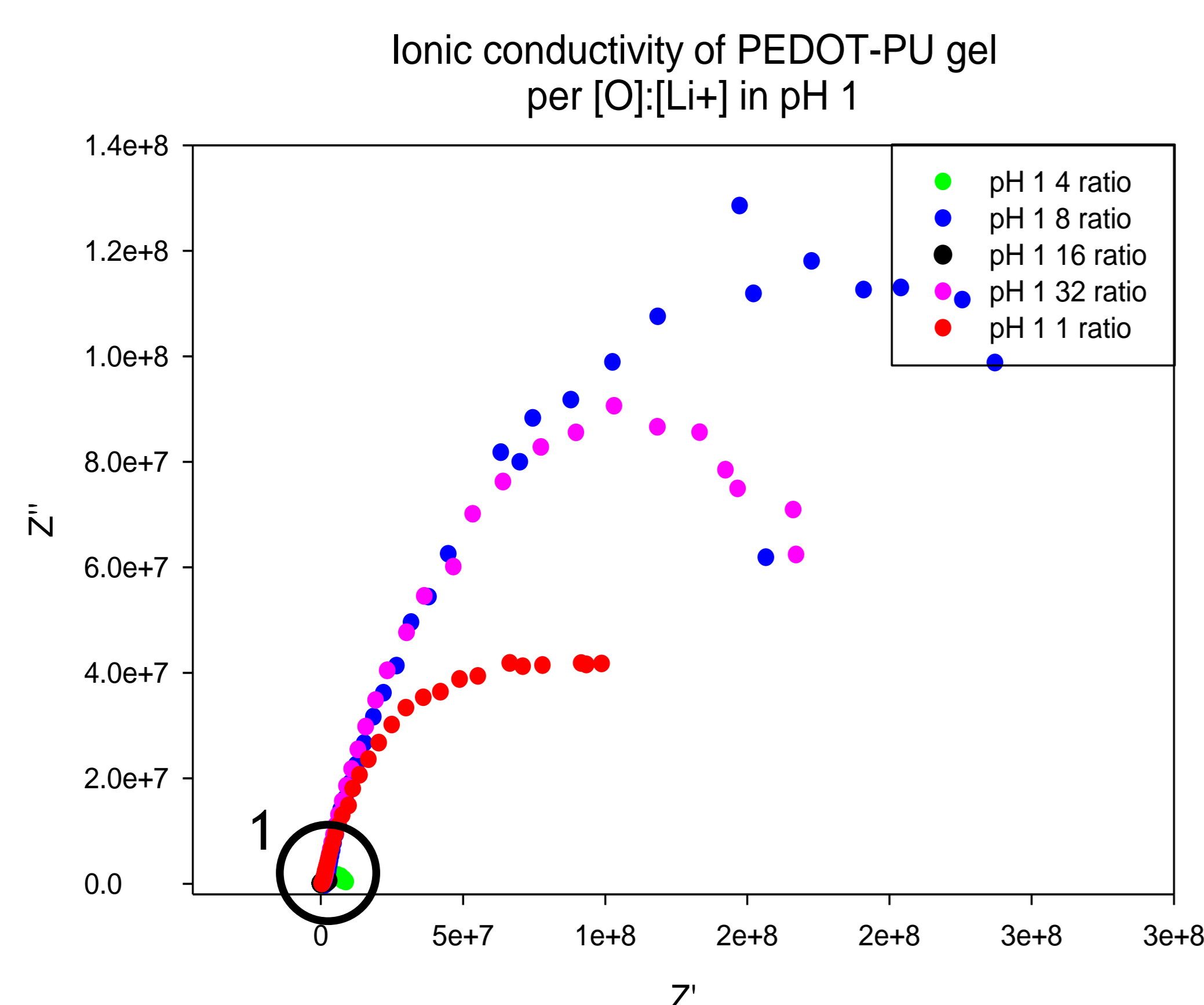
Cyclic Voltammetry



Conductivity

pH	Thickness (cm)	Surface Resistance (Ω/□)	Conductivity (S/cm)
5		211.4	5.915×10^{-5}
3	0.0804	44.38	2.842×10^{-4}
1		13.68	9.683×10^{-4}

Ionic Conductivity



Conclusion

1. The preparation of PEDOT-PEG PU polymer gel electrolyte with different pH level and [O]:[Li+] ratio
2. The change of electro conductivities of dependent on the pH-levels.
3. HNO₃ is better than HCl as a doping acid.
4. The change of ionic conductivities dependent on the [O]:[Li+] ratios.
5. [O]/[Li+]=4 is best ratio for ionic conductivity. (3.451×10^{-6} s/cm)

Acknowledgment

This work was supported by Pusan National University Research Grant, 2014.