

Electrically conducting organic polymers (KDIT28) *syllabus*

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Historical overview and classification of electrically conducting organic polymers.

General characteristics of electron-conductive polymers (EP).

Production of EP, chemical and electrochemical polymerization.

Electropolymerization processes. Electropolymerization in aqueous and non-aqueous media. The effect of solvent and conductive salt on EP synthesis. Incorporation of anions into EP.

Properties of the electrochemical polymerization of different monomers. Effect of substituents.

Physical properties of EP, conductive properties. Redox properties of EP. The phenomenon and interpretation of electrochemical doping and undoping. Electro-optical properties.

Anodic and cathodic transformations of EP, interpretation of redox properties. The polaron-bipolaron model. Redox mechanisms of EP. Symmetry and hysteresis in the redox behavior of EP. Overexamination and degradation.

EP testing methods. In situ combined measurement techniques. In situ spectroscopy (UV-visible, IR, ESR), electrochemical quartz crystal microbalance (EQCM), laser beam deflection (LBD), principle, implementation and results of in situ conductivity measurement (ISC).

Applications of EP. Possible uses of insulating, semiconducting, and electron-conducting properties. Coatings, electrocatalysts, electrochemical power sources, electronic components, light-emitting devices, and sensors designed using EP. Enzymatic sensors, gas detectors.

Literature

1. Skotheim: Handbook of conducting polymers, volume I-II., chapters 1,3,9,13,25, 35