INFLUENCE OF THE SURFACE STRUCTURE OF METAL ELECTRODES ON DOUBLE LAYER PARAMETERS AND THE REACTION KINETICS.

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Electrochemical results are more easily understood with crystal faces which have a controlled, well defined, atomic arrangement thar with polycrystalline metal electrodes. Experimentally, a chemically clean and physically precisely controlled interphase has to be obtained and maintained. Results will be given for gold and silver, two FCC metals. The PZCS, the adsorption of anions, the UPD and the reduction of solvated protons are very sensitive to the crystallographic orientation.

ELECTROCHEMISTRY OF CONDUCTIVE POLYMERS

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An intensive search for new and promising materials for electrochemistry and the possibility of the use of electrochemical methods for preparation of them are presently the main interest for several laboratories in the world. The progress in this field is rapidly developing by scientist with diverse backgrounds - electrochemistry, solid state physics, material science.

The most interesting materials are undoubtedly conductive polymers. It is not suprising that conductive polymers having properties of plastics and variable electric properties can be compete with metals, semiconductors and charge transfer complexes. The electrical conductivity of these materials can be changed in the wide range e.g. from the values characteristic for insulators up to values for metals. This is shown in Fig.1.

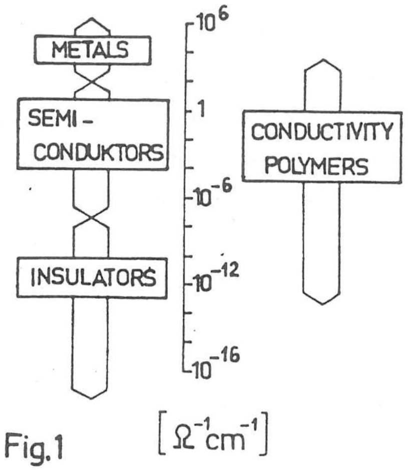

Fig.1

Much emphasis has been given to doping of different kind of polymers. Some of them are presented in Fig.2. The increase of the electrical conductivity after doping is depending on presence of the conjugated double Π-bonds in the chosen polymer. For the simplest polymer e.g. polyacetylene (PA) the conductivity can be explained by the concept of soliton model. The transport of free charge carriers into the PA chain can perform in two ways.

The more rigorous description is that of a soliton (defect), which in the reaction is loosing a spin and simultaneously gaining positive charge during oxidation process (p-doping) or negative charge during reduction process (n-doping). On the other hand, formation of polaron having a charge and a spin 1/2, e.g. radical cation during p-doping or radical anion during n-doping may be considered. In bonding and antybonding states with the energy level 0.3 eV, above the valancy band edge and 0.3 eV below the conduction band edge, respectively, has been deduced on the basis of the different measurements. After recombination the bipolarons are formed and with regard to the degeneration of the ground state, they are transformed into two solitons. After doping solitons states in the forbidden band of PA forms soliton band. If PA is doped to

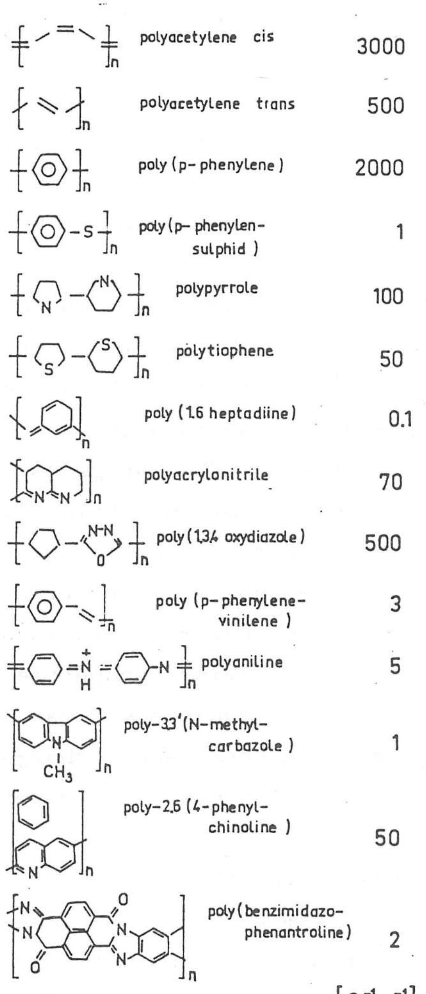

Fig. 2

7% of dopant the valency and conduction bands are connected by the soliton model.

Conductive polymers exhibit attractive properties e.g. mechanical, magnetic, thermoelectric, and their characteristic values can be selected, depending on the starting polymer for doping, method of preparation, kind of dopant and degree of doping. The electrochemical properties seem to be the most interesting. Electrochemical oxidation or reduction allow the precise control of the doping and the preparation of the conductive polymers with desire properties (metallic, semiconducting) are also more precise. If PA is doped into the semiconducting regime, Schottky barriers can be made.

Conductive polymers offer many possibilities within the area of energy conversion and storage, primary and secondary batteries (scheme of the battery is presented in Fig.3), fuel cells, electronic devices, detecting elements, molecular electronics.

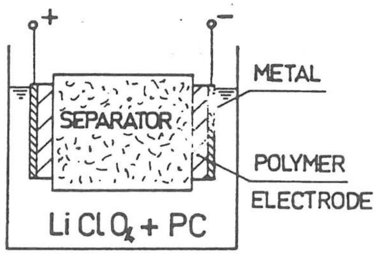

Fig. 3

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