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NEW VIEW ON THE ORIGIN OF HIGH CONDUCTIVITY OF POLYANILINE FILMS PROTONATED BY HYDROCHLORIC ACID

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Polyaniline (PANI) is a material known for its high conductivity and also huge range of obtainable conductivities. In general, three types of charge carriers are considered in PANI salt, namely holes, polarons and protons. Many authors attribute the high conductivity of acid doped PANI to polarons [1-3]. We show that conductivity of polarons might not be necessarily the prevailing mechanism of charge transport. In our research in order to separate contributions from different charge carriers PANI/Si heterojunction was studied. Impedance spectra were measured to distinguish between polaron and hole mobilities. From V-A characteristics on PANI/Si structure contribution of polaron and hole conductivity was calculated. Dielectric spectra of heterojunction were measured to estimate conductivity of ions. Both measurements resulted in values in order of magnitude $\sim 10^{-7} \text{ S.cm}^{-1}$. On the contrary conductivity of several S.cm^{-1} on films of PANI on glass substrates were obtained using ohmic gold electrodes. To explain discrepancy between obtained values of conductivity a model utilising redox reaction of hydrogen and chlorine was proposed and diffusion of hydrogen and chlorine molecules in PANI films were studied.

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