

## Accepted Manuscript

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PII: S0013-4686(15)00426-0  
DOI: <http://dx.doi.org/doi:10.1016/j.electacta.2015.02.140>  
Reference: EA 24419

To appear in: *Electrochimica Acta*

Received date: 7-12-2014  
Revised date: 15-2-2015  
Accepted date: 16-2-2015

Please cite this article as: V.V.Malev, REFORMULATION OF CHARGE TRANSFER AND MATERIAL BALANCE EQUATIONS OF POLARON-CONTAINING POLYMER FILMS, *Electrochimica Acta* <http://dx.doi.org/10.1016/j.electacta.2015.02.140>

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# REFORMULATION OF CHARGE TRANSFER AND MATERIAL BALANCE EQUATIONS OF POLARON-CONTAINING POLYMER FILMS

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**Abstract:** As known, polaron quasi-particles of conducting polymers contain from 3 to 6 monomer fragments (repeat units) of polymer chains. This is the reason why the widely accepted approach to treating the polaron conductance assumes that the reduced forms of polarons have the same number of repeat units as included into polarons and, moreover, treats such reduced formations as separate quasi-particles. The latter obviously means that charge transfer from a polaron to a neighboring reduced quasi-particle proceeds with simultaneous transformations of all the fragments of these quasi-particles. In other words, the distance of charge transfer in such transitions is assumed to be exactly equal to the polaron size. In contrast to such treatment, the main feature of the proposed approach is a polaron flux reformulation, which assumes a unit polaron translocation to be of a one monomer size independently of number  $m$  of monomer fragments included into polaron quasi-particles. As a result, material balance equations of polaron-conducting films take a more complicated form than that accepted in the existing approach. It is shown that, at equilibrium conditions, the obtained equations, as it must be, lead to the relationships being in accordance with thermodynamic ones. At the same time, a proper analysis reveals some differences between quantitative results that follow from the proposed and traditional approaches for both quasi-equilibrium and non-equilibrium conditions. Possible directions of the further development of the represented approach are shortly discussed.

Keywords:

Polymer chains, charge transfer, polaron, cyclic voltammetry, impedance.

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