

Processus de conduction par multi-piégeage et saut des électrons dans les semi-conducteurs désordonnés

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Authors: S. Tobbeche and A. Merazga.

Abstract

In this paper, we study the phototransport properties of disordered semiconductors by simulation. We have simulated numerically the transient photoconductivity (TPC) which takes into account the multiple trapping transitions to describe conduction in extended states and the hopping transitions to describe conduction in localised states. We have developed a model which joins together the multiple trapping and hopping transport mechanisms. It is formed by continuity equations in transient state and these equations were solved numerically to calculate transient photoconductivity. The TPC results obtained for low temperatures in hydrogenated amorphous silicon a-Si:H are in excellent agreement with the predictions of the Monroe's analysis on the thermalisation of the charge carriers and transport in exponential distribution of localised states. We also used the simulation to study the relative contributions of extended state conduction with multiple trapping and hopping conduction through the localized states on transient photoconductivity for various densities of localized states in disordered semiconductors.

Keywords a-Si:H - Multiple trapping – Hopping – Phototransport.

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