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7th International Conference on Chaotic Modeling and Simulation, CHAOS 2014; Hotel ZuriqueRua
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Step-wise fractal kinetics in physical ageing: Compositional complexity in network glass-formers (Conference Paper)

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Краткое описание

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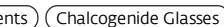
Sigmoid behavior of natural physical ageing in network glass-formers revealing multi-step-wise growing kinetics of enthalpy losses $\Delta H(t)$ is studied at the example of glassy Se-rich arsenoselenides As-Se ($As_{10}Se_{90}$, $As_{20}Se_{80}$ and $As_{30}Se_{70}$). It is shown that phenomenological description of this ageing kinetics can be adequately developed in terms of first-order relaxation processes, tending atomic structure of a glass from initial towards more thermodynamically equilibrium state. The microstructure mechanism of natural physical ageing is explained by specificity of structural-topological complexes in the studied glasses (ratio between structural fragments having heteropolar As-Se and homopolar As-As and Se-Se covalent chemical bonds). This kinetics is shown to obey characteristic stretched exponential behavior originated from a number of growing steps, attributed to interconnected processes of chalcogen chains alignment and cooperative shrinkage of a whole glassy-like network. Developed model of natural physical ageing explains well the observed stretch-exponential behavior of low-temperature relaxation kinetics in terms of hierarchically-constrained mixed serial-parallel relaxation events having different atomic precursors, such as Se-based chains - Se-Se-Se-, =As-Se-Se- and =As-Se-As=) This phenomenological ageing kinetics can be decomposed into a few elementary components, each of them approaching to single exponential dependence. © 2014 ISAST

Важность темы SciVal

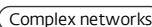
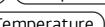
Тема: Glass | Chalcogenides | Constraint theory

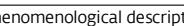
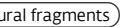
Процентиль важности: 87.085 

Ключевые слова автора

Differential Scanning Calorimetry , Glassy Network , Physical Ageing , Structural Fragments , Chalcogenide Glasses 

Включенные в указатель ключевые слова

Engineering controlled terms: Bond strength (chemical) , Complex networks , Differential scanning calorimetry , Glass , Kinetics 
Relaxation processes , Temperature 

Engineering uncontrolled terms: Compositional complexity , Exponential behaviors , Exponential dependence 
Low temperature relaxation , Microstructure mechanism , Phenomenological description 
Physical ageing , Structural fragments 

Engineering main heading: Selenium compounds 

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