Elucidation of proton diffusion mechanisms by solid-state NMR

Proton diffusion measurements in inorganic solid acid salts (potential solid electrolytes in fuel cells) containing no water

Shigenobu Hayashi
Research Institute of Instrumentation Frontier
E-mail:hayashi.s@aist.go.jp

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Fast proton-conductive materials containing no water are promising in application to solid electrolytes in fuel cells. Some inorganic solid acid salts show high proton conductivity. We have studied proton dynamics in $CsHSO_4$ by means of ^1H solid-state NMR. The proton mean residence times are determined, which can well explain the macroscopic electric conductivity, as shown in Fig. 1. Proton transfer between two neighboring SO_4 tetrahedra takes place much more easily than the reorientation of the SO_4 tetrahedra in both the room-temperature phase and the high-temperature phase. Thus, the SO_4 reorientation limits the rate of the proton transport.

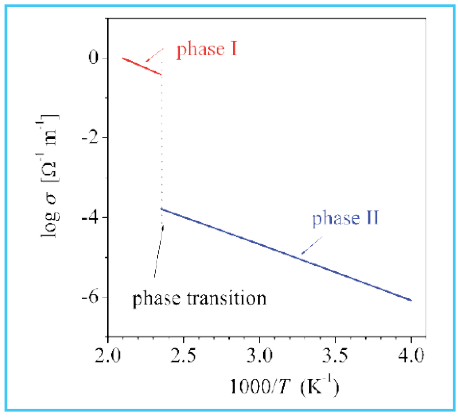

Fig. Proton conductivity estimated from NMR results.

High Accuracy Automatic Fitting for Next Generation Transistor Model HiSIM

Cost Reduction for Development of Semiconductor Manufacturing Process through Application of Genetic Algorithm

Masahiro Murakawa
Advanced Semiconductor Research Center
E-mail:m.murakawa@aist.go.jp

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We have developed an automatic fitting method using the GA (Genetic Algorithm) for next generation transistor model HiSIM (Hiroshima University-STARC IGFET Model) to be used for circuit simulation in the development of advanced semiconductor manufacturing process. The fitting experiments were performed using MOSFET devices fabricated with the most advanced process (90 nm rule) provided by STARC. To accomplish the fitting, it took only a few hours using eight PCs, whereas it would typically take several days even for a skilled person. This technology will be commercialized by the Evolvable Systems Research Institute, Inc., a venture enterprise authorized by the AIST.

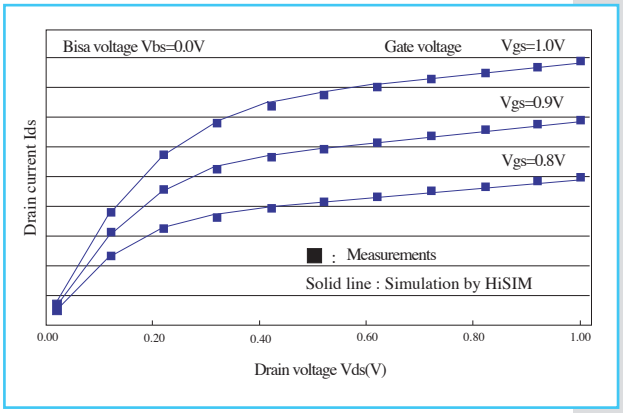

Fig. Fitting results for Ids-Vds characteristics of MOSFET: Lg(Channel length)=0.10um/Wg(Channel width)=2.0um. RMS errors for all devices were within only 2.5%.