energy transport equations (system of six partial differential equations). Several applications of industrial interest employ devices operating in a wide temperature range. Therefore, our models have been designed to meet this challenge in addition to the conventional Si applications. MINIMOS-NT has been successfully used for simulation of heterostructure devices, e.g. High Electron Mobility Transistors (HEMTs) and Heterojunction Bipolar Transistors (HBTs)[3]. For example, the simulated forward Gummel plots for AlGaAs/GaAs or InGaP/GaAs HBTs compared to experimental data up to 380 K show excellent agreement and demonstrate the ability of MINIMOS-NT to reproduce correctly the thermal device behavior.

References

[1]S. Selberherr, A. Schütz, and H. Pötzl, "MINIMOS—A Two-Dimensional MOS Transistor Analyzer," *IEEE Trans.Electron Devices*, vol. ED-27, no. 8, pp. 1540–1550, 1980.

[2]P. Maycock, "Thermal Conductivity of Silicon, Germanium, III-V Compounds and III-V Alloys," *Solid-State Electron.*, vol. 10, pp. 161–168, 1967. [3]V. Palankovski, S. Selberherr, and R. Schultheis, "Simulation of Heterojunction Bipolar Transistors on Gallium-Arsenide," in *Simulation of Semiconductor Processes and Devices*, (Kyoto, Japan), pp. 227–230, 1999.

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III-V SEMICONDUCTOR MATERIALS IN MINIMOS-NT.

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Considerable effort was spent on our two-dimensional device simulator MINIMOS-NT to get it ready for simulation of devices with high complexity and specifity in respect to materials, geometries, etc. Many of the existing physical models (band gap, mobility, thermal conductivity, energy relaxation times, specific heat, etc.) were refined, some of them were replaced by promising new ones, and many new models were added as well. Being an ancestor of the well-known MOS device simulator MINIMOS[1], its experience with Si devices was inherited. Thereby, MINIMOS-NT became a generic device simulator accounting for a variety of materials, including IV group semiconductors, III-V compound semiconductors and their alloys, and non-ideal dielectrics. For example, the temperature dependence of the thermal conductivity is modeled by a simple power law which gives a good agreement with experimental data[2]. In the case of alloy materials $A_{1-x}B_x$ it varies between the values of the basic materials (A and B). The model is used for device simulation with self-heating by solving the lattice heat flow equation self-consistently with the