

COMPOUND SEMICONDUCTOR NANOWIRES FOR ELECTRONICS AND OPTOELECTRONICS

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Epitaxially grown semiconductor nanowires have attracted considerable interest. Among them III/V nanowires are uniquely suited for high carrier mobility electronic devices and efficient energy transformation, both from electrical-to-light and from light-to-electrical energy. The application of InAs and GaAs based nanowires for electronic and optoelectronic applications is reviewed. Selected examples are presented underlining the specific advantages of InAs and GaAs nanowires. A novel heterogeneous integration scheme for heterogeneous nanowire transistor implementation in existing circuits is proposed. Both an inverter circuit and a sample & hold circuit function is experimentally confirmed. The improvement of minority carrier transport is found to be the key parameter for future application of nanowire solar cells. At present, the

extremely robust performance under very intense illumination ($> 1,500$ suns) may stimulate industrial applications. Acknowledgment: The Collaboration with Prof. Takao Waho, Sophia University, Tokyo, Financial support from JST-DFG Program on Nanoelectronics, the DFG Research Group FOR 1616 and the German Ministry of Research and Education is gratefully acknowledged.

Werner Prost received the Ph.D. degree in electrical engineering from Duisburg University in 1989. Since then he headed the epitaxial growth lab and the nano-electronic activities of the Solid-State Electronics Department at the University Duisburg-Essen. His main interest is to contribute to the development of micro-, nano-, and optoelectronic devices for communication technology by means of advanced heterostructure technology. He has (co-) authored more than 160 papers in scientific journals and conference proceedings.

Werner Prost contributed to the Center of Excellence SFB 254 and SFB 445 and he coordinated two EU projects on Resonant Tunneling Devices. He is member of DFG priority program FOR 1616 on nanowire optoelectronics, the "German Crystal Growth Association" (DGKK), and overseas member of the technical group on electron devices of the Japanese Institute of Electronics, Information and Communication Engineers.