

Refractory Metals and Silicides Featured at European Workshop

The European Workshop on Refractory Metals and Silicides took place in Saltsjöbaden, outside Stockholm, Sweden, March 24-27, 1991. Nearly 70 contributions, half oral and half poster presentations, covered the field from thin film reactions and physical properties to applications. A one-day topical conference on chemical vapor deposition (CVD) extended the workshop to four days. The fourth in a biennial series, this meeting was organized by the Department of Solid State Electronics at the Royal Institute of Technology in cooperation with the European Materials Research Society and IEEE.

The CVD session included invited talks by R. Madar, who focused on low-temperature and selective silicide deposition, and J.O. Carlsson, who gave an account of the basic principles of selective metal CVD. Selective deposition of $TiSi_2$ by rapid thermal processes was covered by A. Bouteville and by J.L. Regolini. However, most of the CVD contributions dealt with deposition and properties of tungsten layers, with some focus on application issues such as adhesion, device properties, and cost.

Various aspects of self- and impurity diffusion were discussed. In an invited talk, P. Gas elucidated the influence of various diffusion paths, solubility limits, segregation, etc. on diffusion experiments. Previously

overlooked conditions for the utility of tracer elements in reactive growth studies were reported by S.L. Zhang. J. Philibert discussed reactive diffusion and thin film reactions, and stressed the basic identity of thin film and bulk processes. The thin film session also covered work on interface and grain boundary properties and included contributions on carbides and germanides. H. von Känel reviewed epitaxial silicide growth; R. Jevasinski, K. Maex, and A. Vantomme all described specific work on ion beam synthesis of buried $CoSi_2$ layers. The strong position maintained by $TiSi_2$, due to its self-aligned capabilities, was reflected in several papers on formation, dopant interactions, and shallow junction properties.

Potential and obstacles for the incorporation of refractory metals and silicides in advanced technologies were discussed by C.M. Osburn and K. Maex. Osburn emphasized that the problems are important and that reduced device dimensions not only call for resistance-reducing solutions, but also aggravate the difficulties associated with a successful silicide implementation. Various complications of a process, such as polymer residues or high dopant concentrations, may affect the silicide formation in an irreproducible manner. Shallow junctions call for thin silicide layers, plagued by stability and uniformity limitations. One possibility for producing silicide junctions is to reverse the order of junction and silicide formation, i.e., to use the silicide as a dopant diffusion source. Another solution, which may be required in future

processing, is to avoid silicon consumption through selective deposition techniques. More specific materials aspects were considered by Maex, who pointed out that the general need for a low-resistivity silicide on top of a heavily doped silicon substrate requires precise knowledge about metal-dopant interactions and compound formation. In more specific applications, various properties, such as stress generation, interactions with SiO_2 , and resistance to conventional cleaning and etching procedures, must be evaluated separately. Of interest in this context is the effect of silicidation on defect generation and removal. Epitaxially aligned silicide layers are of special significance to the development of novel device structures.

The future of the field and the contributing roles of universities, research institutes, and industry were addressed in a panel discussion with representatives from these organizations. Challenges remain and span a broad range; while the university's objective is to gain, preserve and communicate basic knowledge, yield and economics force industry to concentrate on contamination control and related issues.

The workshop provided a relaxed yet stimulating atmosphere with ample time for informal discussions. A fifth workshop will be held in Delft, Holland, in spring 1993. The proceedings of the Stockholm meeting will appear as a special issue of *Applied Surface Science*.

S. Nygren
Royal Institute of Technology

Attention MRS Members in Japan

MRS members in Japan may now order MRS books from AIMS Corporation in Japan at MRS member prices. MRS members in Japan may still order the books directly from MRS in the United States or take advantage of the speed and economy of purchasing books through AIMS.

Contact:

AIMS Corporation 2-8-17 Shinbashi Minato-ku Tokyo 105, Japan Phone (81) (3) 501-1059 Fax (81) (3) 501-1388	or	Materials Research Society 9800 McKnight Road Pittsburgh, PA 15237 U.S.A. Phone (412) 367-3003 Fax (412) 367-4373
--	----	---

Workshop on Thin Films for the 21st Century

July 28 - August 2, 1991
Northwestern University

Key scientists, technologists, educators, and industrial and government leaders will gather to ask where thin film technology will be 10 to 20 years from now, what fundamental scientific issues will bring about future developments, what future manufacturing requirements will be, and if current education in this area is adequate.

Topics: Si and group IV materials, compound semiconductors, polymer/biological/organic insulators, superconductors/ceramics, magnetic materials.

Invited internationally distinguished speakers will give talks each morning, followed by panel discussions in the afternoon and contributed poster presentations in the evening.

For information contact: Judy Turner, Northwestern University, Materials Research Center, 2145 Sheridan Road, Evanston, IL 60208-3116; phone (708) 491-3606; fax (708) 491-4181.

Sponsored by the NSF and Northwestern University; co-sponsored by the International Union of Materials Research Societies and MRS.