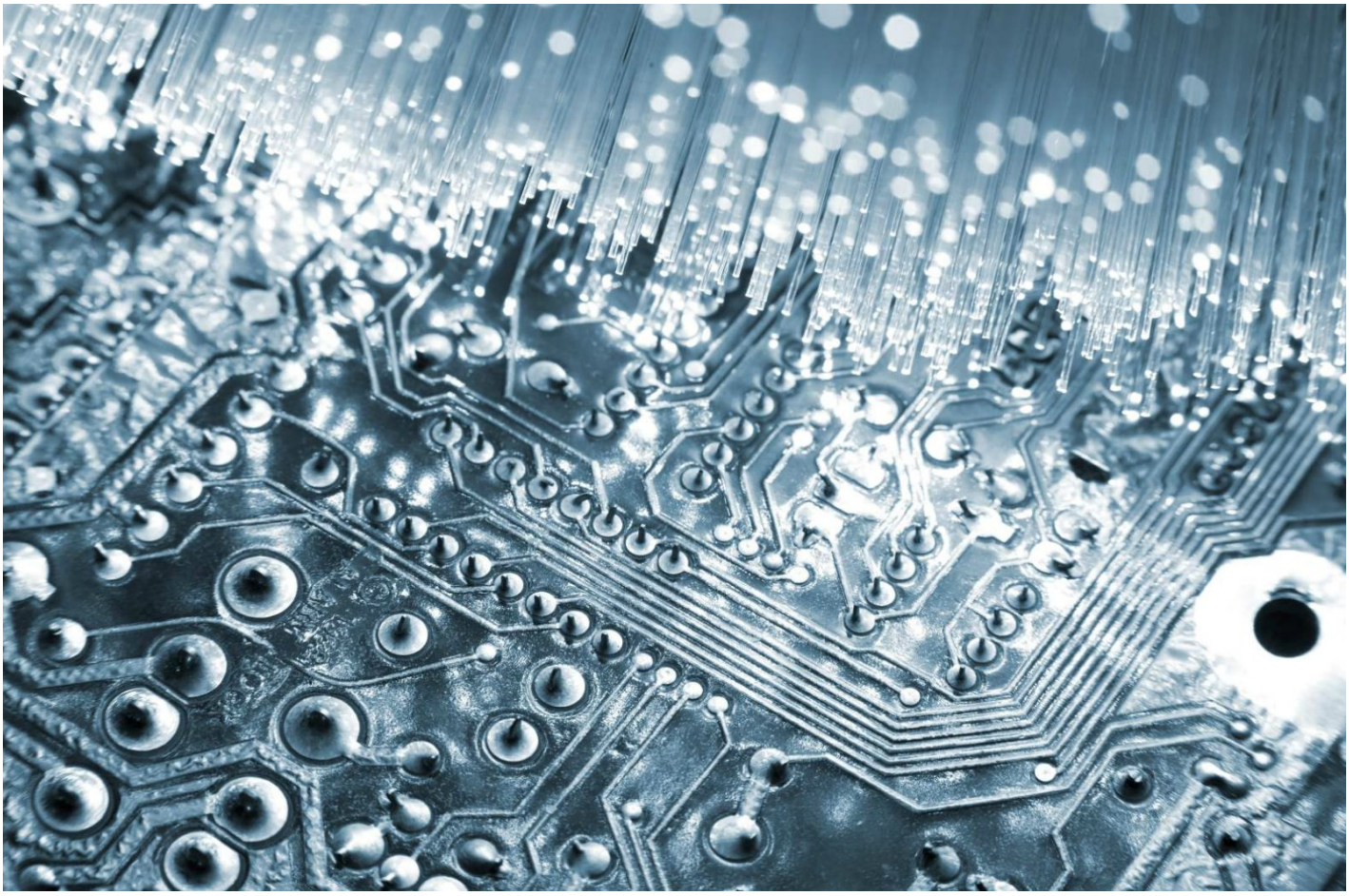
# New Oxide Technology Improves The Efficiency Of Semiconductors

University of Illinois, Chicago



The effectiveness of a semiconductor greatly depends on the chemical properties of its conductive materials — especially for some purposes the purity of the oxide layers grown or deposited on it. Native oxides (those that are formed on the material) tend to be better matched, more stable, and perform better than deposited oxides (which are mechanically applied directly to the chip). Although native-oxide technology already exists for the silicon chip, no such technology has been available until recently for non-siliconbased semiconductors.

Professor Nick Holonyak Jr., Ph.D., and graduate student J.M. Dallesasse of University of Illinois's electrical and computer engineering department, remedied this problem in 1989–1990 by inventing the process called "Forming a Native Oxide from Aluminum-Bearing Group III-V Semiconductor Material." Initial funding was supplied by the National Science Foundation and the U.S. Army.

By immersing aluminum-bearing Group III-V semiconductor material in a hot “wet” gaseous environment, a smooth, solid layer of aluminum-bearing native oxide is generated.

> *As in this case, native oxides are preferred for semiconductors because they are more dense, stable and defect-free compared to deposited oxides.*

Optoelectronic and microelectronic devices that utilize native-oxide technology are more efficient, lower cost, and longer-lasting than those that use deposited oxides. Native oxides also improve the performance of lasers and light-emitting diodes (LEDs). This technology has been licensed by the University of Illinois to companies around the world who manufacture electronic products that utilize this unique, advanced material.

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