



## ***Birck Seminar Series***



### **Converging Multi-Substrate Processing Technologies for 2.5D and 3D Heterogeneous Integration**

**Dr. Peter Bermel**

*Professor Of Elmore Family of Electrical and Computer Engineering*

**Wednesday October 16th @ 2:00 pm in BRK 1001**

*Coffee and snacks served before seminar*

**Zoom Link:** <https://purdue-edu.zoom.us/j/95283400606>

#### **Abstract:**

The future of semiconductor technologies depends on continual increases in the density of components and functionality. As different types of chips have become specialized in different applications, 2.5D and 3D heterogeneous integration methods have been developed and implemented to squeeze different chips into very tight spaces. At the same time, most of these process technologies are targeted at a single substrate or interposer, even though different substrates such as silicon, ceramics, polymers, and glass offer significantly different strengths and capabilities, depending on the application space. In this work, a method of converging the processing methods of these different types of substrates to create identically functioning packages. Here, we present the results of several different recent experiments, and discuss achievements to date. Convergence is achieved in the embedding process, while partial convergence of Si and AlN is achieved in the back-filling process. Future work relating to completing process integration and performing initial testing is also briefly discussed.

#### **Bio:**

Dr. Peter Bermel leads the Energy & Nanophotonics research group at Purdue University, which leverages nanophotonics to improve the performance of microelectronics and energy systems. He has served as the PI for two major centers in secure electronics: ASSURE and SCALE, and over 40 awards from major research sponsors, such as the National Science Foundation, the Office of Naval Research, the Department of Energy, the Semiconductor Research Corporation, Northrop Grumman Corporation, NEC Corporation, the Purdue Research Foundation, Applied Research Institute, and the Department of Defense. He is a recipient of a National Science Foundation (NSF) CAREER award, a Winston Churchill Foundation Scholarship, an NSF Graduate Research Fellowship, an MIT Compton Fellowship, and the Elmore Named Professor Position. Dr. Bermel is widely published in scientific peer-reviewed journals, and has been cited over 10,500 times, for an h-index of 42. His work is a recurring topic in publications geared towards the general public, including the Washington Post, NPR, and IEEE Spectrum – most recently, for his work on microelectronics workforce development.