

### 3. Fundamentals of Glass Technology and Applications for Advanced Semiconductor Packaging

**Course Leader: Indrajit Dutta – Corning, Inc.**

#### **Course Objective:**

This course is intended to guide technologists toward a deeper understanding of how to leverage engineered glass as a material for advanced IC packaging applications. Following a review of the fundamental principles of glass structure, composition, and properties, we will discuss the unique attributes that make glass an enabling material: including strength and reliability, chemical durability, thermal behavior, associated thermal relaxation behavior, and electrical properties. In addition, we will review the “glass toolkit” as a platform alternative for semiconductor packaging development including various manufacturing (glass melting and forming) approaches, the diversity of compositional options, and a survey of glass processing approaches that can be adapted from adjacent glass technology spaces to advanced semiconductor packaging. Finally, a series of case studies will illustrate how glass is contributing to emerging technologies in the microelectronics space and explore current and potential applications in advanced semiconductor packaging, consumer electronics, and internet of things (IoT) applications. Examples include the role of glass as a carrier for temporary bonding, integrated glass wafers for optical sensors and augmented reality, key components in RF communications, as well as glass interposers for 2.5D and 3D packaging.

#### **Course Outline:**

1. Fundamentals of Glass
  - What is Glass?
  - Overview of Glass Attributes
2. Versatility of Glass
  - Glass Composition Review
  - Melting and Forming Process
  - Overview of Major Forming Processes
  - Secondary Processes
  - Options for Enhanced Properties
3. Major Applications and Markets
  - Wafer-Level Optics
  - Semiconductor
  - Case Studies

#### **Who Should Attend:**

Engineers, technical managers, scientists, buyers, and managers involved in materials, research and development, as well as advanced semiconductor packaging. We welcome individuals or companies with little or no experience in using glass

#### **Bio:**

**Indrajit (Indy) Dutta**, PhD, is a Development Associate in Corning Incorporated’s Glass Development group. Currently, Indy supports the Corning Carrier Solutions product line as technical lead. Corning Carrier Solutions is part of a new business unit within Corning called Precision Glass Solutions, which offers industry-leading glass-enabled solutions for semiconductor, consumer electronics, and Internet of Things (IoT) applications. Indy has earned a B.S. in Ceramics Technology from University of Calcutta and a Ph.D. in Materials Science from University of Cincinnati. He has spent the majority of his career in material innovation, processing, and characterization for a variety of applications from energy to mobile phones to semiconductors.