

Ablation Science and Technology

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ABSTRACT

The Koo Research Group (KRG) at UT Austin has been specializing in “Ablation Research” for the past fifteen years. Recently, the group has developed some very unique capabilities that could advance “Ablation Science & Technology” using both experimental and numerical approach. The purpose of this 6 hrs. short course presented at RMIT University is to introduce to our RMIT colleagues the methodology KRG has developed to solve this challenging problem. Past and current sponsors relating to our “Ablation Research” include DoD (AFOSR, AFRL, AMDEC, DTRA, MDA, NAVAIR, NAVSEA, & ONR), DoE, NASA, and private companies. This short course is based on Dr. Koo’s forthcoming new book, “*Ablation Science and Technology*,” Cambridge University Press, Cambridge, UK (2020) which includes the following topics:

- Ablation Science
- Introduction to Ablative Materials
- Aerothermal Ablation Testing Techniques and Specific Test Facilities
- Advanced Sensing Technologies for Ablatives
- Ablative Material Properties Characterization
- Numerical Modeling of Ablation
- Applications of Ablative Materials
- Challenges and Trends of Ablation

ABOUT THE SPEAKERS

Dr. Koo has over 40 years of industrial and academic experience in program and engineering management. Currently, he is Senior Research Scientist/Research Professor, and Director of Polymer Nanocomposites Technology Lab in the Department of Mechanical Engineering at The University of Texas at Austin, Austin, TX. He is the founder of KAI and currently served as Vice President and CTO. He is a SAMPE Fellow and Chairman of the SAMPE Nanotechnology Committee. Dr. Koo is an Associate Fellow of AIAA and past-chair of the AIAA Materials Technical Committee. He is the Editor-in-Chief, *Flame Retardancy and Thermal Stability of Materials* (<http://www.degruyter.com/view/j/flret>). He specializes in polymer nanocomposites, such as ablatives for thermal protection system and rocket propulsion system, flame-retardant polymers and ultra-performance polymers for additive manufacturing, fire resistant nonwoven and woven fabrics, thermally conductive polymer matrix composites, sensors to measure in situ ablation recession and thermal properties, sensors to measure char strength, modeling of polymer degradation, material response ablation modeling, and hypersonic flowfield modeling. Dr. Koo’s publications include three textbooks: *Polymer Nanocomposites: Processing, Characterization, and Applications*, 1st ed., McGraw-Hill, New York (2006); *Fundamentals, Properties, and Applications of Polymer Nanocomposites*, Cambridge University Press, Cambridge, UK (2016); *Polymer Nanocomposites: Processing, Characterization, and Applications*, 2nd ed., McGraw-Hill, New York (2019), 15 book chapters, and over 550 papers/presentations in materials, thermal and optical science disciplines. *Ablation Science and Technology: Processing, Characterization, and Modeling*, Cambridge University Press, Cambridge, UK is forthcoming in June 2020.