



13th Annual O.U.R. Fall Conference

PLENARY SPEAKER

Dr. Tolga Aytug

Distinguished Research Staff Member

Distinguished UT-Battelle Inventor

Chemical Sciences Division

Oak Ridge National Laboratory, TN

Galloway Bldg. Landes 101

November 13, 2026, from 9:15 to 10:00 a.m.

SHORT BIOGRAPHY

Dr. Tolga Aytug is a distinguished research staff member of the Chemical Sciences Division and distinguished Battelle inventor at Oak Ridge National Laboratory. He received his Ph.D. in physics from The University of Kansas in 2000. He has more than 30 years of experience in processing of advanced materials using both physical and chemical vapor deposition approaches as well as advanced materials characterization and property correlations for process optimization. Dr. Aytug's primary research interests are fabrication of thin film heterostructures using both physical vapor and chemical deposition approaches, thermodynamic and kinetic effects on phase nucleation and structure formation as well as development of unique nanostructured material systems and metal-matrix composites for various energy technologies, and novel approaches for the development of transparent and non-transparent nanostructured superhydrophobic coatings with an emphasis on practical applications. Dr. Aytug has authored and co-authored over 150 publications and has written three book chapters. has 23 issued US patents. He has commercialized and licensed his technologies to 6 companies.

Dr. Aytug has received numerous awards of excellence including 2007, 2010, 2012, 2014, 2015, 2021, and 2026 R&D100 Awards; 2020 Battelle Celebration of Solvers Award, UT-Battelle Inventor of the Year Award (2019); 2008, 2010, 2017 National Federal Laboratory Consortia Excellence in Technology Transfer Awards; 2011 and 2007 Southeast Federal Laboratory Consortia Award; 2023 and 2014 ORNL Research Accomplishment Awards; and 2006 and 2017 ORNL Excellence in Technology Transfer Awards.

BIO INSPIRED SURFACE MORPHOLOGIES: NANOSTRUCTURED ANTIREFLECTIVITY AND SUPERHYDROPHOBICITY

Natural biological structures, particularly the moth's eye and lotus leaf, have inspired the development of low-refractive-index antireflective glass films that exhibit omnidirectional optical properties over a broad wavelength range while also providing water-repellent, or superhydrophobic, functionality. These multifunctional coatings have significant potential for applications in solar panels, lenses, detectors, architectural windows, optical components for defense systems, and many other products. I will particularly focus on metastable spinodal phase separation in a low-alkali borosilicate glass system, enabling the formation of optical-quality, nanotextured porous thin-glass-film coatings. These coatings simultaneously provide graded-refractive-index antireflective performance and superhydrophobic, anti-soiling functionality, while maintaining excellent mechanical durability.