# Plasma-assisted Reactive Magnetron Sputtering for Optical Coatings

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In the optical coating area, efforts have been made to improve the performance of optical thin-film filters that are needed in optical and optoelectronic devices. These optical thin film filters must be made by alternating high and low refractive index materials. The standards that these filters must meet have also become stricter. Therefore, there are two critical issues with optical coatings. First, we have to develop new and improved processes for the deposition of thin film materials, which were highly stable, mechanically strong, low absorption, and, last but not least, low cost. Second, we need to develop new methods to design optical multilayer coatings. Recently, HIPIMS has attracted considerable attention to thin film sputtering, and it has been widely applied in various industrial sectors. The reactive HiPIMS process also has potential applications for optical coatings and provides an alternative method to solve the abovementioned issues.

In this presentation, we will discuss the optical properties of aluminum nitride and aluminum oxide films prepared by reactive HiPIMS, superimposed HiPIMS-MF sputtering, and plasma-assisted reactive HIPMS, and study graded-index-like rugate filters prepared by reactive HiPIMS and DOMS process with PEM control.

Short biography:

Dr. Chien-Jen Tang received his Ph. D. degree in the Institute of Optical Science at National Central University, Taiwan, in 2007. From 2006 to 2008, he served as a Principal Engineer at the R&D center of Paragon Technologies Co., Ltd., where he was responsible for research and development related to magnetron sputtering systems for functional coatings. Subsequently, he joined the Department and Institute of Opto-Electronic System Engineering at Minghsin University of Science and Technology as an assistant professor from 2008 to 2012 and then as an associate professor from 2012 to 2014. In 2014, he joined the faculty of the Department of Photonics at Feng Chia University. His research interests are primarily involved in the design, fabrication, and measurements of optical thin films by using magnetron sputtering technology. More recently, He focused on the plasma-assisted reactive magnetron sputtering (PARMS) process and its application in optical coatings, especially in highly wear-resistant anti-reflective coatings, low-temperature deposited thermochromic vanadium-tungsten oxide film, and gradient index films. He consistently engages in technology innovation with an industry-oriented approach, providing technical consulting and training courses to various companies.