**Applications of Deep Spectroscopy in Micro and Nanophotonics**

*Ideaoptics Inc., China*

**Dr. Haiwei Yin**

**Email: hyway@ideaoptics.cn**

Spectra serve as the distinctive fingerprint information of substances, playing a crucial role in the exploration of the intricate light-matter interaction. In the wake of the burgeoning developments in micro and nanophotonics, there arises a pressing need for in-situ and multi-dimensional measurement and characterization of the optical properties of micro-nano photonic structures.

To address this demand, we have innovatively developed a systematic spectral technology termed "Deep Spectroscopy". This groundbreaking approach facilitates in-situ and multi-dimensional measurements in real space, momentum space, and frequency space. It encompasses the analysis of spectrum, polarization, and phase. By synergizing advanced theories in optics, photonics, spectroscopy, and artificial intelligence algorithms, we achieve precise characterization and metrology of micro-nano photonic structures.

This innovative technology finds practical applications in the study of micro-nano photonic structures, including but not limited to metamaterials, metasurfaces, photonic crystals, and photonic structures in nature. Moreover, it empowers the investigation of photonic band structures, spatial dispersion, light transport, nonlinear effects, topological properties, and various other optical phenomena within these systems. The acquisition of comprehensive optical property information from micro-nano photonic structures unveils novel physical phenomena and processes, providing a robust experimental tool for exploring the intricate interaction mechanisms between light and these structures, as well as discovering new optical effects.

**Short Bio:**

**Haiwei Yin** received his PhD degree in Condensed Matter Physics from Fudan University. He is the founder of Ideaoptics Inc., the director of the Shanghai Engineering Research Center of Optical Metrology for Nano-fabrication, the member of the Microscopy Instrument Branch of the China Instrument and Control Society, the vice director of the Fudan University-Ideaoptics Joint Research Center for Optical Metrology and Photonic Integration. Dr. Haiwei Yin primarily engages in research and industrial applications of micro and nanophotonics, deep spectroscopy, and related fields. He has made original contributions to the principles and applications of microscopic angular resolved spectroscopy technology, and has published 10+ peer-reviewed journal including PNAS and Light: Science & Applications. Dr. Yin holds more than 150 intellectual property rights, including invention patents.