SCALABLE AND COST-EFFECTIVE OPTICAL COMPONENTS FOR BIOSENSING APPLICATIONS

Wei-Chuan Shih, PhD University of Houston USA
wshih@Central.UH.EDU

Cost-effectiveness has been a key factor in consumer biophotonics. In this talk, I will discuss two approaches for overall cost reduction. First, I will introduce a highly porous yet monolithic plasmonic nanosurface that features intense and high-density hot spots, large surface area, and high structural integrity and reproducibility. The fabrication process of this nanosurface is of low-cost and highly scalable. Using localized surface plasmon resonance (LSPR) and coupling modes, enhanced light-matter interactions near the nanosurface can be realized. The surface enhancement results in stronger signal which reduces the burden on high-end optical detection systems. We have applied them to several analytical Chem/Biosensing platforms for a range of sensing targets by various spectroscopic and imaging techniques. Nanoplasmonic sensors appear to provide potential solutions in a range of applications from precision medicine to point-of-care diagnostics and wearable technologies. In the second approach, we have developed an “inkjet printing” process for making polymer lenses which enable high quality microscopic imaging using smartphones – High performance microscopy of nanoscale objects and molecular species can be carried out on $10 phones. Finally, I will discuss the synergy of plasmonic enhancement and smartphone microscopy in the context of consumer biophotonics.