Title

Deep optical imaging and efficient light energy delivery in disordered media

Abstract

Light incident on inhomogeneous media, such as random nanostructures and biological tissues, is limited in propagation depth because it is reflected by multiple scattering and only a small portion is transmitted. In the case of optical imaging, the waves preserving the imaging information of a target object are getting weaker with depth while those multiply scattered by a disordered medium are getting stronger. As a result, the object can no longer be identified as the depth of the object increases. However, we can enhance the light energy delivery inside or through the medium by means of the constructive interference of light. In addition, we can increase an imaging depth by the in-phase accumulation of the singly reflected waves and the spatial correlation between incidence and reflection. These studies have been actively conducted for the past 10 years with the development of the wavefront shaping techniques.

In this seminar, I will present studies that I have conducted in this field since 2009, such as light energy delivery, deep-depth imaging, and the control of the multiply scattered surface plasmon polaritons. I will also introduce remarkable results of an endomicroscopic study that is well suited for *in vivo* label-free imaging.