

Preface: Multiphoton Microscopy

Two-photon excitation microscopy (also referred to as multiphoton laser scanning microscopy) has gained increasing popularity during the past few years because of the distinct advantages over single-photon microscopy, which includes increased penetration depth and low out-of-focus photobleaching and photodamage. It allows superior imaging of thick specimen compared to single-photon microscopy, and it excels at imaging live cells either single or within intact tissue. This highly valuable tool has been used with great success to gain important new insights into brain tissue, embryos, whole organs, entire animals, and it has been most useful in numerous other applications.

This special issue of *Microscopy and Microanalysis* contains selected invited papers written by experts in their respective fields who have made significant contributions using two-photon excitation microscopy in their research and present the most recent advances in the field. The articles are either reviews or original contributions. Several important topics are addressed and include advances in neuronal imaging, intravital deep tissue cardiovascular imaging using caged compounds for the study of intracellular dye transfer, dynamics and interactions of proteins in exocytosis using fluorescence life time imaging (FLIM), and fluorescence resonance energy transfer (FRET), enhanced green fluorescence protein (EGFP) applications, cellular activities in oxygen sensing tissue, imaging of membrane potential, intravital imaging of oocytes, breast cancer, and others.

It is a great pleasure and timely to edit this special issue, and I am most grateful for the outstanding contributed papers. I would like to sincerely thank all contributors for their superb contributions and for sharing their unique expertise with the microscopy community. I hope that this special issue will stimulate further fruitful two-photon excitation microscopy applications.

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