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Special Section on Spatial Frequency Domain Imaging

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Special Section on Spatial Frequency Domain Imaging

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This special section of the *Journal of Biomedical Optics* (JBO) features fourteen articles related to the use of spatial frequency domain imaging (SFDI) as a core methodology for evaluating tissue optical properties. Covering a broad range of topics, this special section presents the latest work in SFDI.

SFDI is a wide-field imaging technique that has garnered significant research attention in the last twenty years. The fundamental principle underlying this technology was first introduced in 1998 by Dögnitz et al.,¹ and quickly matured into a unique way to rapidly image quantitatively large fields-of-view at mesoscopic and macroscopic scales thanks to the developments by Cuccia et al.^{2,3} starting in 2005. Due to its unique capabilities for quantifying optical properties of living tissues rapidly, the method has gained significant interest from the biomedical optics community with, as of today, more than 130 articles published. In recent years, SFDI has been the topic of dedicated sessions at a number of meetings with contributors from around all the world.

The contributions to this special section of JBO Volume 24, Issue 7, cover a broad range of topics that best illustrate the activity in this field. There are two review articles covering the use of structured illumination—one at a macroscopic scale,⁴ and a second focused more specifically on SFDI.⁵ A second category of articles focus on modeling in the spatial frequency domain (SFD), including assessment of optical sampling depth in the SFD,⁶ development of analytical models for separation of surface and volumetric scattering,⁷ implantation of machine learning methodology to rapidly extract optical properties,⁸ and derivation of a deterministic radiative transport solver.⁹ A third category of articles focus on new instrumentation advances to enable concurrent temporal and spatial modulation of light for rapid oxygenation imaging,¹⁰ improvement of image quality via a single snapshot of optical

properties,¹¹ and the potential of a single pixel camera in combination with SFDI,¹² and a hyperspectral SFDI acquisition system.¹³ Finally, there is a group of articles to enhance clinical applications, including characterization of resected cancerous breast tissue,¹⁴ guidance of intra-operative tumor resection,¹⁵ and correction of light attenuation for improved Cherenkov imaging,¹⁶ and monitoring of burn wound and skin graft healing.¹⁷

We thank all the authors and reviewers who contributed to this special section and hope it is a useful resource. We also thank the JBO staff for their assistance and support. We hope that the work featured in this special section will provide a launchpad for others to use SFDI for fundamental research as well as practical clinical applications.

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