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Solid State Triple Wavelength Illumination Systems for Diagnostic Applications

White continuous spectrum illumination (e.g. by LED) is widely used for diagnostic imaging in dermatology and endoscopy. We propose to replace it by combined triple discrete spectral line illumination using RGB laser emission launched into an optical fiber. This allows extracting three ultra-narrowband spectral line images from single-snapshot image data captured by a consumer-grade color camera [1-5] and opens new challenges for improved clinical diagnostics.

A prototype device comprising side-emitting optical fiber illuminator was developed for large-area skin spectral imaging at 450nm, 520nm and 628nm wavelengths. Another prototype device combined three spectral lines for white illumination of intranasal cavities using a low power RGB laser-fiber system attached to the lighting channel of endoscope. Three spectral line images for diagnostic applications were extracted from single snapshot RGB image data in both cases.

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References.

1. J.Spigulis, I.Oshina, A.Berzina., A.Bykov, “Smartphone snapshot mapping of skin chromophores under triple-wavelength laser illumination”, J.Biomed.Opt., 22(9), 091508 (2017).
2. J.Spigulis, I.Oshina, M., Matulenko “Laser illumination designs for snapshot multi-spectral-line imaging”, IEEE Xplore, <https://ieeexplore.ieee.org/document/8872998> (2019).
3. D.Pfaffrods, M.Stafeckis, J.Spigulis, D.Boucher, “Side-emitting optical fiber”, patent LV 11644 B (1995).
4. J.Spigulis, I.Oshina, Z.Rupenheits, M.Matulenko, “Device for uniform surface illumination simultaneously by several laser spectral lines”, patent LV 15491 B (2020).
5. J.Spigulis. Ultra-Narrowband Multippectral Imaging: Techniques and Applications., CRC Press, Boca Raton, USA / Abingdon, UK (2024).

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