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Contribution ID: **3351** Type: **Oral Competition (Graduate Student) / Compétition orale (Étudiant(e) du 2e ou 3e cycle)**

(G*) A novel optical filter-based Raman system operating in strong ambient light for in vivo clinical applications

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A portable optical system and methods have been developed for real-time synchronous detection of vibration and rotation modes in biotic systems. It consists of a modulated light source, laser beam shaping and light collecting optics, optical detectors, appropriately selected optical filters, a laser beam modulator, current-to-voltage converters, and lock-in amplifiers. The weak signal of characteristic Raman scattering peaks of glycerides is identified using the sensitive lock-in amplification technique, which supersedes the state-of-the-art for other similar approaches and allows for the detection of weak Raman signals in ambient LED and luminescent light conditions. Parallel measurements of duck fat phantoms and duck liver samples using an FT-Raman spectrometer and our handheld probe indicate that our system can provide a quantitative result on the fat content quickly and accurately in lipid phantoms and liver samples, demonstrating a strong linear correlation ($r^2 > 0.97$) between intensities of output voltage signals, MRI readings, and fat contents in the clinically relevant range (20%-60%) with a sensitivity of 16.75μV / 1% change in fat content, though the hand-held probe is 10-fold cheaper than an FT-Raman system. An accurate real-time assessment of donor liver fat contents is hopeful to be achieved during organ procurement surgeries, which is crucial in predicting liver graft post-transplant dysfunction risks. Features of this device now need to be further evaluated by studying ex-situ and in-situ human livers.

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