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Suppression of Non-Resonant Background in Broadband Coherent Anti-Stokes Raman Scattering Microscopy with Interferometry[1] TAK KEE, MARCUS CICERONE, National Institute of Standards and Technology — We demonstrate an interferometric technique for suppressing non-resonant background in broadband coherent anti-Stokes Raman scattering (CARS) microscopy. CARS microscopy has become an important biological imaging tool due to its non-invasiveness, and high spatial resolution. Our previous work on developing broadband CARS microscopy has improved the chemical specificity significantly by increasing the spectral coverage to > 2500 cm^{-1} [T.W. Kee, M.T. Cicerone, *Opt. Lett.* **29**, 2701 (2004)]. Although CARS microscopy provides high sensitivity in the C-H stretch region of the vibrational spectrum, the signals in the Raman fingerprint region suffer from low signal-to-background ratio because of the presence of a non-resonant background due to the electronic response of the sample. Suppressing the non-resonant background signal is crucial in order to develop CARS microscopy into a powerful technique to image biochemical reactions in cells. In our approach, a broadband CARS signal with high spectral resolution interferes with another broadband CARS signal with lower spectral resolution. Fourier transform of the interferometric measurements allow the extraction of the imaginary part of the signal, which is free of the non-resonant background.

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