

BROADBAND MICROWAVE 3-WAVE MIXING: ASSIGNMENT-FREE CHIRALITY DETECTION IN UNKNOWN SAMPLES

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Straightforward identification of chiral molecules in multi-component mixtures of unknown composition is extremely challenging. Current spectrometric and chromatographic methods cannot unambiguously identify components while the state of the art spectroscopic methods are limited by the difficult and time-consuming task of spectral assignment. Here, we introduce a highly sensitive generalized version of microwave three-wave mixing that uses broad-spectrum fields to detect chiral molecules in enantiomeric excess without any prior chemical knowledge of the sample. This method does not require spectral assignment as a necessary step to extract information out of a spectrum. We demonstrate our method by recording three-wave mixing spectra of multi-component samples that provide direct evidence of enantiomeric excess. Our method opens up new capabilities in ultrasensitive phase-coherent spectroscopic detection that can be applied for chiral detection in real-life mixtures, raw products of chemical reactions and difficult to assign novel exotic species.