

IS IT CHIRAL? TOWARDS IDENTIFYING CHIRALITY IN UNKNOWN SAMPLES WITHOUT PRIOR SPECTRAL ASSIGNMENT.

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Current spectroscopic methods^{a,b} can only detect and quantify chirality if the molecular composition of the sample has been determined. Therefore, before extracting enantiomeric information from a spectrum of an unknown sample, one needs to compare it to previously measured spectra, or to simulated spectra generated with previously determined rotational constants.

We describe new developments towards an updated version of the microwave three-wave mixing technique (M3WM)^c in a buffer gas cell, that can unambiguously identify the presence of chiral species in an unknown sample with no need for prior spectral assignment or knowledge of the sample composition. This work combines the established sensitivity of 3WM in a buffer gas cell in determining enantiomeric information with broadband microwave fields, and an optimized sample input, and it opens up new directions in chirality detection towards real-life molecular samples and complicated mixtures.

^aSérgio R. Domingos et al. ,Sensing Chirality with Rotational Spectroscopy Annual Review of Physical Chemistry 69:1, 499-519 (2018).

^bNafe, L. A.; Dukor, R. K.; Freedman, T. B. Handbook of Vibrational Spectroscopy: Vibrational Circular Dichroism; Wiley Online Library, 2006.

^cPatterson, D. Et al , Enantiomer-specific detection of chiral molecules via microwave spectroscopy. Nature 497, 475–477 (2013).