

FULLY ISOMER-RESOLVED SPECTROSCOPY AND ULTRAFAST DYNAMICS

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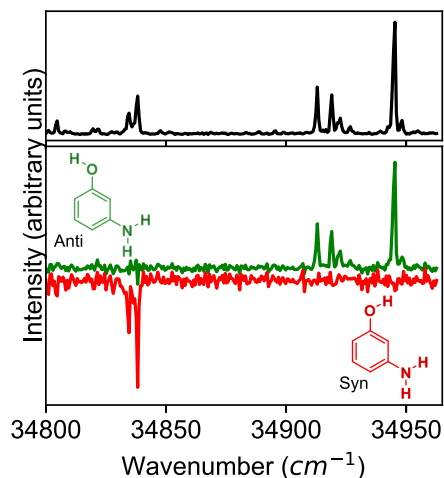


Figure 1: Single-color REMPI spectra of 3-Aminophenol. Top - conventional molecular beam. Bottom - spectra in fully conformer-separated beam.

In gas-phase experiments using molecular beams, formation of many isomers cannot be prevented and their presence significantly complicates assignment of spectral lines. Current isomer-resolved spectroscopy techniques make use of elaborate double-resonance schemes, requiring at least two fully tuneable laser sources. We present here an alternative approach that utilises electrostatic deflection to spatially separate isomers and create isomer-pure molecular beams. This adds isomer resolution to conventional single-color REMPI spectroscopy, which we demonstrate here for the *syn* and *anti* conformers of 3-aminophenol, as shown in Figure 1. This approach furthermore makes the assignment of all transitions to an isomer trivial, without any additional *a priori* information.

This approach can add isomer resolution to any molecular beam based spectroscopy experiment. We show here also the first application of this methodology to study ultrafast dynamics and present the first results of fully isomer-resolved dynamics. In particular, we show that the *syn* and *anti* conformers of 2-chlorophenol exhibit very different relaxation dynamics following UV excitation, highlighting the influence of a single hydrogen bond on the underlying ultrafast relaxation processes. Our approach is generally applicable to all isomers that exhibit a difference in dipole moment and will, for example, allow the study of tautomer-resolved dynamics in biomolecules.