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New 2D IR techniques for studying the structures and dynamics of biomolecules

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Two-dimensional infrared spectroscopy is proving to be a powerful technique for studying biomolecular structures and their rapid dynamics. We report investigations into the equilibrium structures of a series of DNA oligomers using 2D IR spectroscopy, where we have found vibrational modes that are delocalized over stacked bases and coupled to adjacent strands through hydrogen bonded basepairs. We also report new advances in time-resolved pulse sequences optimized for extracting vibrational dynamics and the coupling between vibrational modes of biomolecules.