Identification of isomeric biomolecules by spectroscopy of non-covalent ionic complexes.

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Identification of isomeric biomolecules remains in the focus of analytical chemistry. Large size and, typically, similar structures of biomolecules often make it difficult to distinguish them. Since recently UV and IR action cold ion spectroscopy demonstrates high capability in identification and quantification of isomeric biomolecules.[1] Often, spectroscopic signatures of isomers are sufficiently different to become their tags that do not depend on experimental conditions. UV action spectroscopy is applicable, however, only to the molecules that absorb in UV. Many types of biomolecules, for instance, carbohydrates and lipids do not own a chromophore. To overcome this limitation, we make use of non-covalent complexes of these biomolecules with aromatic reporter molecules.[2-6] The complexes may differ in network and length of intermolecular non-covalent bonds, which differently alter absorption of the attached aromatic. This makes action spectra of such complexes reliable individual tags of isomers.

In this paper we demonstrate how non-covalent complexes can be used to identify and quantify isomeric carbohydrates and lipids by UV and IR spectroscopy of cryogenically cold ions. In particular, we show that the use of chiral reporter molecules may allow identification of chiral biomolecules, which absorption (apart from circular dichroism) is fundamentally indistinguishable.

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