

Ion Mobility Mass Spectrometry for Structural Biology

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The coupling of ion mobility (IM) spectrometry with mass spectrometry (MS) has enabled the two-dimensional separation of gas-phase ions according to 'size' and mass-to-charge ratio. IM separation is achieved by exploiting the differences in ability of ions to traverse a region of inert gas under the influence of a weak electric field, and can thereby be used to determine their collisional cross sections. We use IM MS to interrogate heterogeneous protein assemblies in the 100 kDa to 1 MDa range, intact in the gas phase. MS allows us to identify and quantify the relative abundances of the different species, and the concurrent IM measurements allows us to obtain information as to their individual sizes. These experiments therefore provide powerful restraints in modeling the structures of protein assemblies which are difficult to study by conventional structural biology approaches.