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Characterising the hygroscopic properties of organic/inorganic/aqueous aerosol in single particle measurements

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We will describe novel comparative measurements of the hygroscopic properties of multicomponent organic/inorganic/aqueous aerosol through the application of aerosol optical tweezers and cavity enhanced Raman scattering. Aerosol tweezers allow the simultaneous control over multiple micron-sized particles of different composition; cavity enhanced Raman scattering allows the direct interrogation of particle composition and size with nanometre accuracy. This combination of techniques permits direct and simultaneous measurements of the variations in wet particle size with change in relative humidity (RH) for two aerosols of different composition. Further, the influence of an organic component on the cyrstallisation RH can be directly observed. The spectroscopic tools allow the direct interrogation of the mixing state of organic/aqueous components and the characterisation of surface organic films on aqueous droplets. Thus, the influences of phase partitioning and surface composition on the response in particle size and composition to changes in RH can be interrogated. The application of these techniques in benchmark studies of the behaviour of aerosols containing different inorganic components, containing a water soluble organic component, and containing a surface active organic component will be described.