Title: Experimental proof of light scattering theory for aggregates by IR spectroscopic absorption measurements

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Absorption and scattering of electromagnetic radiation are important processes in the science and technology of particulate media and aerosols, not only for optical characterization techniques but also for the thermal balance of such media. In many of these systems, to which for instance belong the Earth's atmosphere and interstellar clouds, the particles are not well separated from each other but rather in the state of aggregates, which strongly influences the optical properties of the respective media. Thus, the calculation of absorption and scattering efficiencies for aggregates of micron- and submicron-sized particles is an important problem in optics. We aim at the first detailed experimental spectroscopic measurement of the phonon absorption band profiles of micron-sized particles by means of an infrared microscope for distinct particle agglomerate structures built in a controlled way (i.e. artificially arranged well-defined aggregate structures) on infrared-transparent substrates. Experimentally obtained absorption spectra are utilized as benchmark measurements and compared to simulations using different theoretical light-scattering approaches in order to examine their applicability, convergence and reliability.