

Abstract: In situ Fourier transform infrared (FTIR) extinction spectra of airborne alpha-NAD microparticles generated by two different methods were recorded in the large coolable aerosol chamber AIDA of Forschungszentrum Karlsruhe. The extinction spectrum of alpha-NAD crystals obtained by shock freezing of a HNO₃/H₂O gas mixture could be accurately reproduced using Mie theory with published refractive indices of alpha-NAD as input. In contrast, Mie theory proved to be inadequate to properly reproduce the infrared extinction spectrum of alpha-NAD crystals which were formed via homogeneous nucleation of supercooled HNO₃/H₂O solution droplets, evaporating slowly on a time scale of several hours at about 195 K. Much better agreement between measured and calculated extinction spectra was obtained by T-matrix calculations assuming oblate particles with aspect ratios greater than five. This indicates that strongly aspherical alpha-NAD crystals are obtained when supercooled nitric acid solution droplets freeze and grow slowly, a process which has been discussed as a potential pathway to the formation of crystalline polar stratospheric cloud (PSC) particles.