Optical constants of NH$_3$ and NH$_3$:N$_2$ amorphous ices in the MIR and NIR regions

ALEXANDRE ZANCHET, YAMILET RODRÍGUEZ-LAZCANO, ÓSCAR GÁLVEZ, VÍCTOR J. HERRERO, RAFAEL ESCRIBANO and BELÉN MATÉ

Instituto de Estructura de la Materia, IEM-CSIC, Serrano 123, 28006 Madrid, Spain
vherrero@csic.es

Ammonia ice has been detected on different astrophysical media, ranging from interstellar medium (ISM) particles [1,2] to the surface of various icy bodies of our solar system [3], where nitrogen is also present. We have carried out a detailed study of amorphous NH$_3$ ice, and of NH$_3$:N$_2$ ice mixtures, based on IR spectra in the mid- and near-IR regions, supported by theoretical quantum chemical calculations. The ice samples were generated through vapor deposition on a cold Si substrate under vacuum (details of the experimental set up can be found in refs [4,5]). Spectra of varying thickness were obtained and the optical constants calculated for amorphous NH$_3$ at 15 K and 30 K and for a NH$_3$:N$_2$ mixture at 15 K, in the 500 to 7000 cm$^{-1}$ spectral range, with improved accuracy over previous data where available. Using the imaginary part of the refractive index and a good estimate of the density of our samples, we have also obtained absolute values for the band strengths of the more prominent infrared features in both spectral regions. Our results indicate that the estimated NH$_3$ concentration in ISM ices [1,2] should be scaled upward by $\sim$30%.

This work has been funded by the MICINN of Spain under project FIS2010-16455. O.G. and Y. R.-L. acknowledge financial support from Ramón y Cajal Program of the MICINN and CSIC, JAEDoc Program, respectively.