Mid-IR Optical Constants of the Triclinic Mineral Labradorite

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Radiative transfer light scattering models are commonly used to interpret remotely sensed mid-IR data of planetary bodies to quantitatively determine surface mineralogy. An essential input into these models is the complex index of refraction, $\tilde{n} = n + ik$, where n and k are the real and imaginary indices of refraction. Optical constants are dependent upon both composition and crystal symmetry [1]. The successful use of these models hinges on the availability of optical constants for geologically relevant minerals.

While optical constants have been studied in the past, n and k values have only been determined for minerals belonging to orthorhombic and higher symmetry, with a few exceptions in the monoclinic case. This is due to the increased difficulty of modeling n and k for low symmetry (monoclinic and triclinic) minerals. Only recently has optical constants been derived for triclinic materials [2]. Many common rock forming minerals, such as triclinic feldspar, belong to low symmetry crystal systems and have been ignored in optical constant studies. This results in a lack of n and k values for important minerals, posing a significant problem for remote sensing. Here we have derived the n and k values for a labradorite (plagioclase feldspar) with a composition of approximately $An_{65}Ab_{34}Or_1$.

References:

[1] Shkuratov et al. (2005) *Solar Syst. Res.,* 39, 4, 255-266. [2] Hofer et al. (2014) *Vib. Spect.* 72, 111-118.