## SSHADE Users Newsletter – April 2024 –

## Focus on optical constant

Dear SSHADE users,

This month, we would like to focus on a high-level type of data available in SSHADE: the optical constants. They are very important fundamental properties as they govern the reflection, transmission, and absorption of light within solid materials. Almost 300 spectra of optical constants, including both the refractive index and the extinction coefficient, are already available in SSHADE for various materials: ices, minerals, organics, synthetic materials...

Highly valuable in astrophysics, complex refractive indices are used in radiative transfer models (for example, Mie model) that can, for instance, provide access to parameters of the interstellar medium such as grain size, composition, temperature, and even their thermal history.

The optical constant spectra encompass a large spectral range and various types of measurements. You can see all available data by selecting 'optical constants' in the "Spectrum Type" filter.

 Mid and far-IR data concerning amorphous and crystalline phases of ices, as for <u>H<sub>2</sub>O</u> ice:



Mid-IR optical constants of amorpous H2O Ia at 15K and crystalline H2O Ih at 60K

- Mid-IR optical constants spectrum of amorphous H2O Ia at 15K (imaginary part)
  Mid-IR optical constants spectrum of amorphous H2O Ia at 15K (real part)
- Mid-IR optical constants spectrum of crystalline H2O Ih at 60 K (imaginary part)
- Mid-IR optical constants spectrum of crystalline H2O Ih at 60 K (real part)

Optical constants at low temperature (down to 10K) of synthetic materials with varying composition, as for <u>amorphous silicate dust analogues</u> in the UV-mm range. The analogues are four Mg-rich silicate samples of stoichiometry ranging from enstatite to olivine, and of eight samples of Mg and Fe rich silicates with a pyroxene stoichiometry and differing magnesium and iron content.



- Optical constants of amorphous silicate grains Mg(1-x)FexSiO3, x=0.10, 300 K (imaginary part)
- Optical constants of amorphous silicate grains Mg(1-x)FexSiO3, x=0.10, 300 K (real part)
- Optical constants of amorphous silicate grains Mg(1-x)FexSiO3, x=0.10, 200 K (imaginary part)
- Optical constants of amorphous silicate grains Mg(1-x)FexSiO3, x=0.10, 200 K (real part)
- Optical constants of amorphous silicate grains Mg(1-x)FexSiO3, x=0.10, 100 K (imaginary part)
- Optical constants of amorphous silicate grains Mg(1-x)FexSiO3, x=0.10, 100 K (real part)
- Optical constants of amorphous silicate grains Mg(1-x)FexSiO3, x=0.10, 10 K (imaginary part)
- Optical constants of amorphous silicate grains Mg(1-x)FexSiO3, x=0.10, 10 K (real part)
- Optical constants of amorphous silicate grains Mg(1-x)FexSiO3, x=0.20, 300 K (imaginary part)
- Optical constants of amorphous silicate grains Mg(1-x)FexSiO3, x=0.20, 300 K (real part)
- Optical constants of amorphous silicate grains Mg(1-x)FexSiO3, x=0.20, 200 K (imaginary part)
- Optical constants of amorphous silicate grains Mg(1-x)FexSiO3, x=0.20, 200 K (real part)
- Data for different crystal orientations, as for <u>carbonates</u> in the mid/far- IR [2-200 μm]



## T-dependent optical constants of calcite and dolomite

Wavelength (µm) Optical constants of calcite, polarization parallel to the c-axis, MIR/FIR at 10 K (imaginary part) Optical constants of calcite, polarization parallel to the c-axis, MIR/FIR at 10 K (real part) Optical constants of calcite, polarization perpendicular to the c-axis, MIR/FIR at 10 K (imaginary part) Optical constants of calcite, polarization perpendicular to the c-axis, MIR/FIR at 10 K (real part) Optical constants of calcite, polarization perpendicular to the c-axis, MIR/FIR at 10 K (real part)

Stay tuned for future data.

Have fun with SSHADE data!

The SSHADE Team

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