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SSHADE: the European solid spectroscopy database infrastructure

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Abstract

SSHADE (http://www.sshade.eu) is a database infrastructure containing spectral data of many different types of solids: ices, snows, minerals, carbonaceous matters, meteorites, IDPs and other cosmo-materials,… It cover a wide range of wavelengths: from X-rays, through UV, visible, infrared to millimeter wavelengths. Its Search / Visualization / Export interface is now open to the community.

1. Introduction

Spectroscopy and spectro-imagery are increasingly used in space missions towards planets and small bodies (e.g. OMEGA/Mars Express, VIRTIS/Rosetta, RALPH/New Horizons, MAJIS/JUICE, …) to study the solid phases at their surface. Infrared, Raman, fluorescence and X-rays micro-spectroscopies are also used to study meteorites and cometary dusts in the laboratory and onboard some space missions for in situ measurements. A major contribution to the analysis of these observations is the measurement in the laboratory of spectra of a variety of materials (ices, minerals, organics, …) expected to be present at the surface of the bodies of the solar system or in their ejected grains.

A large number of laboratories in Europe study the spectroscopic properties of a variety of solid materials of astrophysical interest, either natural (terrestrial or extra-terrestrial) or synthetics, as a function of various compositional, structural, textural or environmental parameters. Many of these laboratories boast leading-edge expertise in some solid spectroscopy fields. However most of the published are very difficult to access in a usable form to compare with observations.

1. What is SSHADE?

SSHADE (“Solid Spectroscopy Hosting Architecture of Databases and Expertise") is a project of a set of databases on solid spectroscopy that started its development in September 2015 and is now open to the community since 5th February 2018 (http://www.sshade.eu).

The SSHADE databases cover laboratory, field, airborne as well as simulated spectral data including various levels of products for many different types of solids: ices, snows and molecular solids, minerals, rocks, inorganic solids, natural and synthetics organic and carbonaceous matters, meteorites, IDPs and other cosmo-materials,… They come from a wide range of measurement technics over a wide range of wavelengths: from X-rays, through UV, visible, infrared to millimeter wavelengths

The SSHADE consortium has currently 23 partner groups in 21 laboratories from 8 different European countries plus India and Taiwan. Information about this project can be found in the SSHADE wiki (http://wiki.sshade.eu)

2. SSHADE interface

A user can currently search either spectral data or publications through two distinct forms using a simple ‘Google-style’ search tool that he can complement with a number of specialized filters to refine the search. For the spectral data he can filter his search according to a series of topics: by experiment, by instrument parameters, by environment, by extra-terrestrial object, by sample, by composition and/or by publication. Both tools can be combined.

The user can select and visualise a spectrum, he will then get a page with the collapsible structure of the experiment/spectra, and of the sample/layer(s) /material(s)/constituent(s). The page display a preview of the spectrum together with the main information on the spectrum and on measured sample.

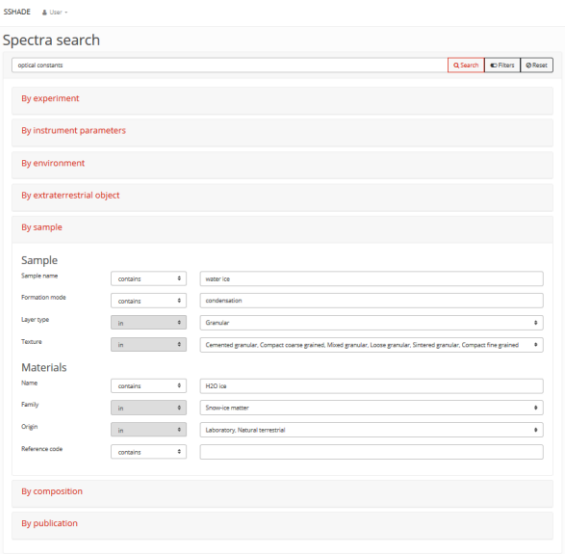

Figure 1: User search page for 'Spectra' showing the different filters for the sample search option.

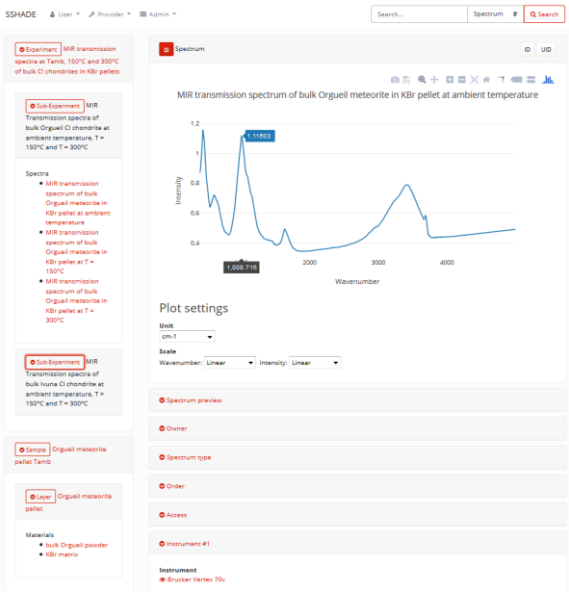

Figure 2: Display of a meteorite spectrum (dynamic), with the different categories of spectrum metadata below (left: experiment and sample structures).

The user can then decide either to visualize the spectrum interactively together with all its associated information, or to look at the detailed information of the experiment or of any part of the sample structure.

The detailed page of each level of the experiment or sample structure contains all the relevant parameters values with different types of links either to another level of the structure, to other information stored in SSHADE (such as publications) or to external pages (such as Wikipedia, WebMineral, …). The users can download a spectrum or an experiment from the export page for immediate and individual download. The users may also add a spectrum or an experiment in the 'basket' for future ex-port.

3. Databases implementation

We are progressively implementing in the SSHADE infrastructure the databases of each of the 20 partners of the SSHADE consortium. 12 databases are already active in SSHADE with over 1400 spectra online covering a wide range of samples, spectroscopic techniques and spectral ranges. Tutorials on the use of the SSHADE database infrastructure will be organized during the conference.

4. SSHADE in Virtual Observatory

SSHADE will be soon a service for Virtual Observatories (VESPA, VAMDC, ...). In particular part of the SSHADE databases will be accessible via the EPN-TAP protocol [1], which will allow comparison with observational data and mass processing in the VESPA environment through a series of dedicated spectroscopy plotting and analysing tools [2].

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References

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