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1ST PROGRESS MEETING OF JRP BXDIFF

WP 5 – Sample survey

RISE Research Institutes of Sweden

Measurement Science & Technology

Time & Optics



Outcome of sample survey WP5

An e-mail with the following questions were sent on 2019-12-02 to 49 partners and stakeholders of BxDiff:

- What are your main interests related to BxDiff (BTDF, BRDF, BSSRDF, multiscale BRDF, modelling etc.)?
- Is there a specific kind of measurement and/or sample that you would like to see improved or evaluated?
- Would you be able to supply any related samples to the project*?

* This could be for example diffusers (bulk or surface scattering, holographic or other types for current or future industrial applications), candidate reference samples for BTDF, BRDF or BSSRDF, or any type of surface/material with special angular optical properties

Limited (~12) but overall positive and interesting responses

Input from stakeholders

Rafael Oser, Optical laboratory at Covestro - BTDF bulk/volume diffusers:

Our questions are:

- Where is “right” measurement plane to focus on (top surface, middle layer of the samples, ...)?,
- Is there a need to measure with half-spheres and matching oil to avoid internal total reflection? This would mean you collect also light from higher scattering angles.

Can supply volume diffusers with different scattering intensity (measured normally in terms of “half power angle”) in 1 – 4mm thickness. (Maximum thickness is 6.4mm.) The samples would consist of polycarbonate as a matrix ($n=1.585$ at 589nm) and the matrix is filled with spherical scattering agent with different diameter and refractive index.

Input from stakeholders

Deroisy Bertrand, Lighting lab at BBRI- Visual comfort, building related

- Optical properties of solar shadings (in general)

“Our activities are focusing on lighting and visual comfort in the context on buildings. In particular we are interested in the optical properties of any product used as solar shading.

In previous studies we have demonstrated that the scattering properties of the used surfaces are an essential parameter for correct assessment of performances. A particular issue is related to daylight glare, which means we are looking for a precise determination of the specular component for reflecting materials (mostly metallic, sometimes with powder coating) and for transparent/translucent materials (glass, plastics, woven screen, etc.). “

- Interested mainly in BRDF and BTDF measurements.
- Specifically samples of narrow scattering translucent solar screens or (micro-)textured glass.
- Could provide samples.

Input from stakeholders

Christian Dietz, Konica Minolta – Sparkle, BRDF, BTDF and modelling

1. Sparkle and related indices, BRDF, BTDF, modelling
2. Simple BRDF measurement (e.g. also on Textiles), Sparkle (especially color sparkle, sparkle lifetime, and influence of aggregation of pigments)
3. Could provide sparkle lifetime and aggregation panels (car exterior test panels) changed by 3 steps

Input from stakeholders

Thomas Dauser, AUDI

- Gloss, visual assessment contra measurements
- Have samples with systematically varying gloss of clearcoatings for visual assessment which could also be supplied for measurements in BxDiff

Input from stakeholders

Sureshkumar Ramasamy, Apple

- Main interest in BRDF and multi scale BRDF
- Second priority be BTDF and BSSRDF
- Samples of Anodized Aluminum and textured glass surfaces could be provided to BxDiff
- Need the samples back after measurements along with measurement results.

Input from partners

For modelling activity A4.2.1

- A simple rough surface of a known opaque material, probably Si or a metal
- Pillar sample from Saint-Gobain, I believe it is made of a transparent material like glass
- A more complicated material like wool, cotton or other textile

General for modelling (from Jeppe)

- BSSRDF
- Sample with known absorption and scattering properties and known physical dimensions.
- Can be purchased from here: https://www.ino.ca/en/biomimic*

*Solid phantoms are fabricated with industrial-grade polymers to which are added specific absorbing and scattering additives. They have optical properties that deliver reproducibility and long-term stability



Input from partners

From Youri for WP4:

- 1) square, planar samples (e.g. 50x50x5mm) made of transparent material (e.g. PMMA, PC, glass) with polished surfaces (no surface scattering, no volume scattering).
- 2) samples, made from the same material, with the same dimensions but with volume scattering, preferably with different concentrations of the volume scattering material (e.g. TiO₂) that is added to the transparent material.
- 3) samples, made from the same material, with the same dimensions but with surface scattering (e.g. uniform, random surface scattering), on one side or two sides or both.
- 4) samples, made from the same material, with the same dimensions but with surface scattering and volume scattering. The same surface and volume scattering as in 2 and 3.

Such a sample set would allow us to do various interesting modelling tests:

- can we model the BTDF/BSDF/BSSRDF of these samples?
- how can we extract the necessary parameters to do this?
- what is exactly needed to do that?

Input from partners

From Annette:

- Primary interests are BRDF of standard materials (i.e. spectralon and ceramics) and BTDF of standards for haze – and in the polarization dependence of the BRDF and BTDF of these materials.
- For BRDF materials, white and black samples for isolating the surface and bulk effects, also glossy and matte samples for different surface distributions – modelling of polarisation.
- For the BTDF materials, difference between surface and bulk scattering materials. Also transmittance haze by studying materials that are mostly forward scattering (within 5 degrees) and then with increments to higher angles – i.e. 20, 40, 80 %.
- Thin spectralon, ground glass etc.