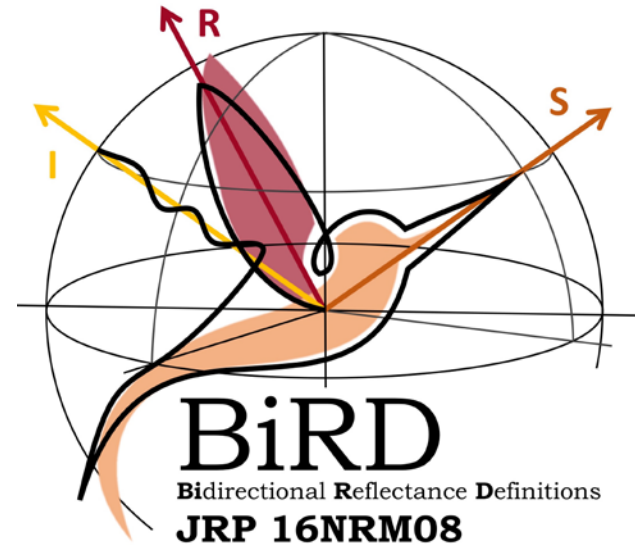
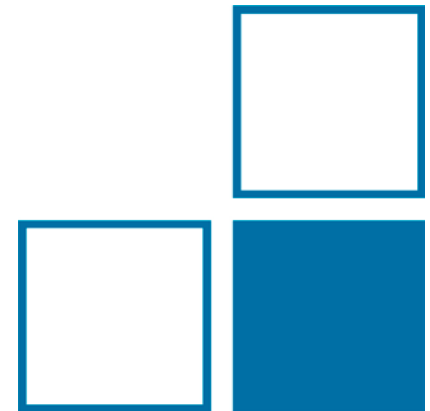


EURAMET EMPIR Project BiRD JRP 16NRM08

Bidirectional Reflectance Definitions
Project within Call Prenormative 2016



Alfred Schirmacher



EURAMET EMPIR Programme

EURAMET - The European Association of National Metrology Institutes

EMPIR - European Metrology Programme for Innovation and Research

EMPIR is the main programme for European research on metrology within HORIZON 2020. It coordinates research projects to address grand challenges, while supporting and developing the SI system of measurement units.

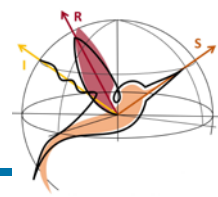
EMPIR calls between 2014 and 2020, total budget of 600 M€

focus on

Health, Energy, Environment, Industry,
Fundamental Metrology, **Standardisation**

*Example: JRP IND52, Multidimensional reflectometry
for industry (xDReflect), 09/2013 to 08/2016*

EURAMET EMPIR Programme BiRD

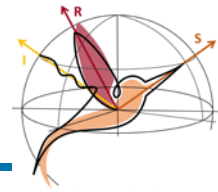


JRP 16NRM08,
**Bidirectional
Reflectance
Definitions (BiRD)**

Start May 2017
Duration 3 years

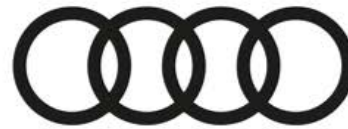
11 partners

CNAM	Conservatoire national des arts et metiers	France
Aalto	Aalto-korkeakoulusäätiö sr	Finland
CMI	Cesky Metrologicky Institut	Czech Republic
CSIC	Agencia Estatal Consejo Superior de Investigaciones Cientificas	Spain
PTB	Physikalisch-Technische Bundesanstalt	Germany
Rise (SP)	Research Institutes of Sweden (SP Sveriges Tekniska Forskningsinstitut AB)	Sweden
Innventia	Innventia AB	Sweden
KU Leuven	Katholieke Universiteit Leuven	Belgium
UA	University of Alicante	Spain
METAS	Eidgenössisches Institut für Metrologie METAS	Switzerland
CI	Callaghan Innovation	New Zealand



AENOR **DIN**

industrial: **20**



normative: **6**



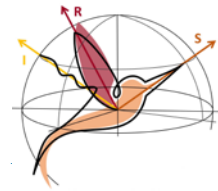
ŠKODA

MERCK-GRUPPE



KONICA MINOLTA





WP1: Recommendation for BRDF measurements (PTB)

Task 1.1: Definition of categories of samples and angles of illumination and detection

Task 1.2: Optical parameters of the illumination and detection beams

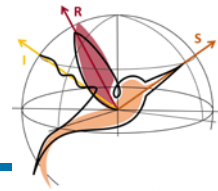
Task 1.3: Measurement area in BRDF measurements

Task 1.4: Influence of polarization and fluorescence as side-effects in BRDF measurements

Task 1.5: Proposal sampling strategy for efficient BRDF measurements

Task 1.6: Technical recommendation on BRDF measurements

..to prepare the technical recommendation on BRDF as working draft for [TC2-85](#) for discussion and ballot

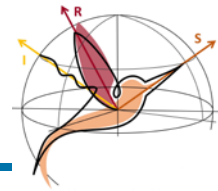


WP2: BRDF data handling and visualisation (UA)

Task 2.1: Universal BRDF file format (CIE Research Forum)

Task 2.2: Appearance descriptors from BRDF data and visualisation modes
open source codes to plot and compare BRDF in polar mode, colour travel in CIELAB space

Task 2.3: BRDF visualisation and management applet
basic free management applet to upload BRDF file format and convert it, tools for like scientific visualisation modes for essential BRDF characterization, appearance features extraction and quality analysis. making the initial version of the applet available to stakeholders



WP3: Gloss (KUL)

Task 3.1: State of the art of gloss measurement and gloss perception

Task 3.2: Establishment of a **CIE TC on gloss**

Task 3.3: Acquisition of parameters on the physical nature of gloss

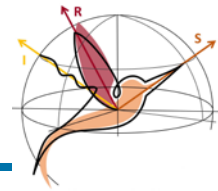
Task 3.4: Acquisition of parameters on the visual nature of gloss

Task 3.5: Recommendations for the physical and visual evaluation of gloss

..to write recommendations for the physical and visual evaluation of gloss which will include proposals for

- i) standard terminology (including the concept of a **standard gloss observer**)*
- ii) a new or adjusted optical measurement method (allowing for the repeatability and reproducibility of gloss measurements)*
- iii) protocol for visual evaluation of surface gloss*

working draft to be submitted to the new TC on gloss, established in Task 3.2



WP4: Sparkle and graininess (CSIC)

Task 4.1: Establishment of a [CIE TC on sparkle and graininess](#)

Task 4.2: Definition of measurands and measurement procedure

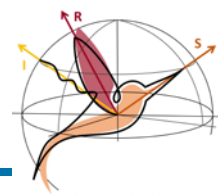
Task 4.3: Testing the present measurement capabilities of NMIs

Task 4.4: Proposal of a measurement and visual scale for sparkle and graininess

Task 4.5: Proposal of measurement procedures and visual scales for sparkle and graininess

..to agree on the most appropriate measurement procedures and visual scales for sparkle and graininess, submit a working draft to the new CIE technical committee

WP5: Creating impact (CMI)



Partnering meeting May 17th, CNAM (Paris)

Website created

<https://www.birdproject.eu>

Bidirectional Reflectance Definitions

Home Summary Project Partners News Project Results References Contact Us

Bidirectional Reflectance Definitions

The Joint Research Project „**Bidirectional Reflectance Definitions**“ focuses on the pre-normative work required to clarify how measurements on standard materials and surfaces exhibiting **goniochromatism**, **gloss and sparkle visual effects** should be carried out. This will enable a reliable comparison of results provided by different measurement devices and better control of the visual effects of products.

Survey for industries making surface reflectance or colour measurements

In this field, the relevant radiometric quantity is the **Bidirectional Reflectance Distribution Function (BRDF)**, which contains extensive information about the light reflected by a surface and therefore information on the appearance of a product.

Significant metrological effort on BRDF measurements has been made over recent years, particularly at the European level due to the EMRP project **IND52 xDReflect**.

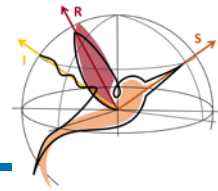
EURAMET

EMPIR

Recent posts

- Survey on measurements of surface reflectance and colour
- Next project meeting
- The project was launched 1st May 2017.

Reflect



Bibliography on brdf of white standards, sparkle, gloss



References

- [Bibliography on Sparkle](#)
- [Bibliography on White Standards](#)

Establish Stakeholder committee on a formal basis

Deliver proposal to CIE to establish a new TC on Sparkle

planned new EMPIR-Project on Appearance („xDReflect 2“):

PRT IND MANU 109

in preparation



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