Anisotropy enhanced X-ray scattering from solvated transition metal complexes - DTU Orbit (05/10/2019)

**Anisotropy enhanced X-ray scattering from solvated transition metal complexes**

Time-resolved X-ray scattering patterns from photoexcited molecules in solution are in many cases anisotropic at the ultrafast time scales accessible at X-ray free-electron lasers (XFELs). This anisotropy arises from the interaction of a linearly polarized UV-Vis pump laser pulse with the sample, which induces anisotropic structural changes that can be captured by femtosecond X-ray pulses. In this work, a method for quantitative analysis of the anisotropic scattering signal arising from an ensemble of molecules is described, and it is demonstrated how its use can enhance the structural sensitivity of the time-resolved X-ray scattering experiment. This method is applied on time-resolved X-ray scattering patterns measured upon photoexcitation of a solvated di-platinum complex at an XFEL, and the key parameters involved are explored. It is shown that a combined analysis of the anisotropic and isotropic difference scattering signals in this experiment allows a more precise determination of the main photoinduced structural change in the solute, i.e. the change in Pt-Pt bond length, and yields more information on the excitation channels than the analysis of the isotropic scattering only. Finally, it is discussed how the anisotropic transient response of the solvent can enable the determination of key experimental parameters such as the instrument response function.

**General information**

Publication status: Published
Organisations: Department of Physics, Neutrons and X-rays for Materials Physics, Department of Chemistry, Department of Electric Power Engineering, University of Iceland, SLAC National Accelerator Laboratory, Technical University of Denmark
Corresponding author: Biasin, E.
Pages: 306-315
Publication date: 2018
Peer-reviewed: Yes

**Publication information**

Journal: Journal of Synchrotron Radiation
Volume: 25
Issue number: 2
ISSN (Print): 0909-0495
Ratings:
BFI (2018): BFI-level 1
Scopus rating (2018): CiteScore 2.68 SJR 1.415 SNIP 1.266
Web of Science (2018): Impact factor 2.452
Web of Science (2018): Indexed yes
Original language: English
Keywords: XFEL, Anisotropic scattering, Molecular structure, Orientational selection, Time-resolved, Ultrafast
DOIs: 10.1107/S1600577517016964
URLs:
https://arxiv.org/abs/1801.06615
Source: FindIt
Source ID: 2396488020
Research output: Contribution to journal › Journal article – Annual report year: 2018 › Research › peer-review