

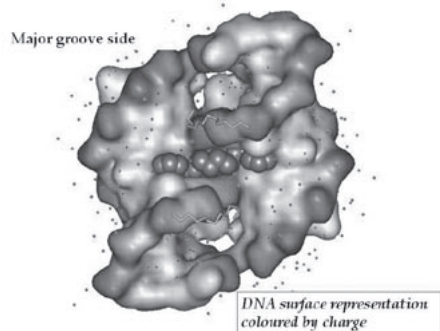
E-mail: c.j.cardin@rdg.ac.uk

The Cardin group has recently been successful[1] in determining the modes of binding to the DNA Holliday junction of a bisintercalator. The acridine chromophores of the bisintercalator replaced two adenine bases at the junction, see Figure. The mode of binding of these so-called bisintercalators is not intercalative, but displacement of the adenosines at position 6 of the crossover strands, and their replacement with acridine groups in the AT basepair. The 4-carboxamide sidechains thread through to the minor groove side of the junction but make no specific hydrogen bond. The acridine chromophore also makes no specific interaction with the unpaired thymine. Rather, the binding is stabilised by stacking interactions, good steric fit and charge neutralisation. The Cardin group characterised the crosslinking of duplex DNA by the same compound[2]. This talk will include recent unpublished results demonstrating that recognition of the junction can take place in solution.

[1]Brogden, A.L., Hopcroft, N.H., Searcey, M., and Cardin, C.J., *Angew. Chem. Internat.Edn.*, 2007, 46,3850-3854.

[2]Hopcroft, N.H., Brogden, A.L., Searcey, M., and Cardin, C.J., *Nucleic Acids Res*, 2006, 34,6663-6672.

Keywords: DNA, Holliday, intercalator



## MS.94.1

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### X-ray Raman scattering: A probe of soft X-ray absorption edges using hard X-rays

Christian Sternemann

Technische Universitaet Dortmund, Fakultaeet Physik / DELTA, Maria-Goeppert-Mayer-Str. 2, Dortmund, Nordrhein-Westfalen, D-44221, Germany, E-mail: christian.sternemann@uni-dortmund.de

Non-resonant x-ray Raman scattering has emerged as a valuable, complementary, and in some cases unique tool to study truly bulk sensitive soft x-ray absorption edges with high energy x-rays, in particular if electrons or soft x-rays are difficult to use as a probe. Nowadays, dedicated experimental endstations are accessible at third generation synchrotron radiation sources which is reflected in a strong increase of x-ray Raman scattering studies during the past decade. This development is accompanied by a considerable progress in understanding non-resonant x-ray Raman spectra theoretically. For low momentum transfers in the so-called dipole limit the measured x-ray Raman spectra can be compared with results of soft x-ray absorption studies. If the momentum transfer is increased non-dipole transitions contribute significantly to the spectra so that the unoccupied density of states can be studied symmetry selectively which has been widely used in, e.g., exciton spectroscopy. Although the main focus of such experiments was set on the study of the very near edge regions it can be used also to access the extended x-ray absorption fine structure. Specifically the bulk sensitivity of this technique makes experiments feasible in which complicated sample environments are needed. Hence manifold studies on liquids and

solids under high pressure conditions have been accomplished. This presentation gives a short introduction to non-resonant x-ray Raman spectroscopy. The special properties of this technique will be emphasized and exemplified by discussing recent studies of liquids, complex materials and samples under extreme conditions.

Keywords: X-ray scattering, absorption spectroscopy, complex materials

## MS.94.2

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### Pressure-induced structural transition in oxides at high pressure: Inelastic X-ray scattering study

Sung Keun Lee

Seoul National University, School of Earth and Environmental Sci., Seoul, Seoul, 151-742, Korea (S), E-mail: sungklee@snu.ac.kr

The structures of crystalline and amorphous oxides at high pressure are essential to understand their thermodynamic and electronic properties. Experimental studies of pressure-induced structural changes in the archetypal low-z oxide glasses and crystals (i.e. borates and silicates), however, limited due to the lack of suitable experimental probes. The inherent difficulties of current technologies pose major challenges for probing structural changes of low-z glasses over a wide pressure ranges. Recent progress in in-situ high pressure inelastic x-ray scattering (IXS) with advanced x-ray optics and diamond anvil cell technology, has enabled us to reveal pressure-induced structural changes in archetypal low z- amorphous and crystalline oxides. Here, we report our recent progress about IXS studies of borates and silicates at high pressure. Pressure-induced structural changes in Na-borate glasses are characterized by a single densification pathway in stark contrast to the multiple pathways shown in Li- and pure borate glasses. Oxygen, boron, and lithium K-edge spectroscopy using IXS reveals the nature of electronic bonding changes in diverse amorphous and crystalline silicates at high pressure up to 40 GPa. The result unveils the important role cation field strength plays in pressure-induced structural changes in oxide glasses. We also account for these differences with a conceptual model that utilizes pressure rigidity (the resistance to structural changes with increased pressurization) defined by the variance of the ratio of energy difference between high and low pressure states to its pressure gradient. The results and methods here give improved prospects for atomistic origins of a gradual -to an abrupt coordination transformation in amorphous and crystalline oxides.

Keywords: inelastic x-ray scattering, amorphous oxides, high-pressure

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### New applications of q-dependent XRS across the periodic table

Seidler T Gerald<sup>1</sup>, Timothy T Fister<sup>2</sup>, Kenneth P Nagle<sup>1</sup>, Joseph A Bradley<sup>1</sup>, Robert A Gordon<sup>3</sup>, Mali Balasubramanian<sup>4</sup>, Steven D Conradson<sup>5</sup>

<sup>1</sup>University of Washington, Physics, Box 351560, Seattle, WA, 98122, USA, <sup>2</sup>Materials Sciences Division, Argonne National Labs, Argonne Illinois, USA 60439, <sup>3</sup>Simon Fraser University, Burnaby British Columbia, CA V5A1S6, <sup>4</sup>Advanced Photon Source, Argonne National Labs, Argonne Illinois, USA 60439, <sup>5</sup>Los Alamos National Labs, Los Alamos NM, USA 87545, E-mail: seidler@phys.washington.edu