	Experiment title: Investigation of the excited-state dimer of chloro-(terpyridine)platinum(II) using pump -probe X-ray solution scattering	Experiment number: CH-4732
Beamline: ID09B	Date of experiment: from: 20/04/2016 to: 25/04/2016	Date of report: 02/03/2015 <i>Received at ESRF:</i>
Shifts: 15	Local contact(s): Martin nors Pedersen	
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Report:

We performed a pump-probe X-ray solution scattering on photoreaction of chloro(terpyridine)platinum(II) (Pt(terp)Cl) complex at ID09B beamline. To investigate the nature of excited-state dimer of Pt(terp)Cl, the concentration of Pt complexes, the ionic strength, and also the pH of the solution were controlled. For each condition, X-ray scattering patterns were collected at time delays of -3 ns; 100, 178, 317, and 564 ps; 1, 1.78, 3.17, 5.64, 10, 17.8, 31.7, 100, and 316 ns; 1 μ s.

We used a typical pump-probe setup installed at ID09B for the experiment. The pulses from a femtosecond CPA amplifier ($\lambda = 800$ nm) was converted to desired wavelength (400 nm) and used. In order to avoid multiphoton excitations, the pulses were stretched with silica prisms to the pulse length of ~ 2 ps before reaching the sample. After excitation, the reaction was probed by hard X-ray pulses ($E_{\text{photon}} = 18.0$ keV) with the X-ray energy bandwidth of 1.89 % (ruthenium multilayer was used). The sample solution was circulated through an open-jet sapphire nozzle and scattering patterns were collected using Rayonix CCD.

Initially, the sample was dissolved in water to a final concentration of 20 mM. For the concentration dependence experiment, the scattering patterns of 10 mM and 2.5 mM sample solutions were also collected. The difference scattering curves of [Pt(terp)Cl] from 100 ps to 1 μ s showed clear oscillatory features with superb S/N ratio (Figure 1). Oscillatory features of difference scattering curves decay as a function of time and resembles 100 ps solvent heating signal at 1 μ s. Also, ionic strength and pH dependence experiments were performed for 20 mM [Pt(terp)Cl] solution (Figure 2). For the ionic strength and pH dependence experiment, 20 mM NaCl and 100 mM NaOH were added to 20 mM [Pt(terp)Cl] solution respectively. Both NaCl and NaOH added [Pt(terp)Cl] solutions showed distinct

scattering patterns compared to 20 mM [Pt(terp)Cl] solution.

In conclusion, we successfully collected time-resolved X-ray solution scattering data of [Pt(terp)Cl] at several time delays and found out difference X-ray scattering patterns are highly dependent on the concentration of Pt complexes, ionic strength, and also the pH of the solution. Now we are analyzing the structure and reaction dynamics of platinum complex.

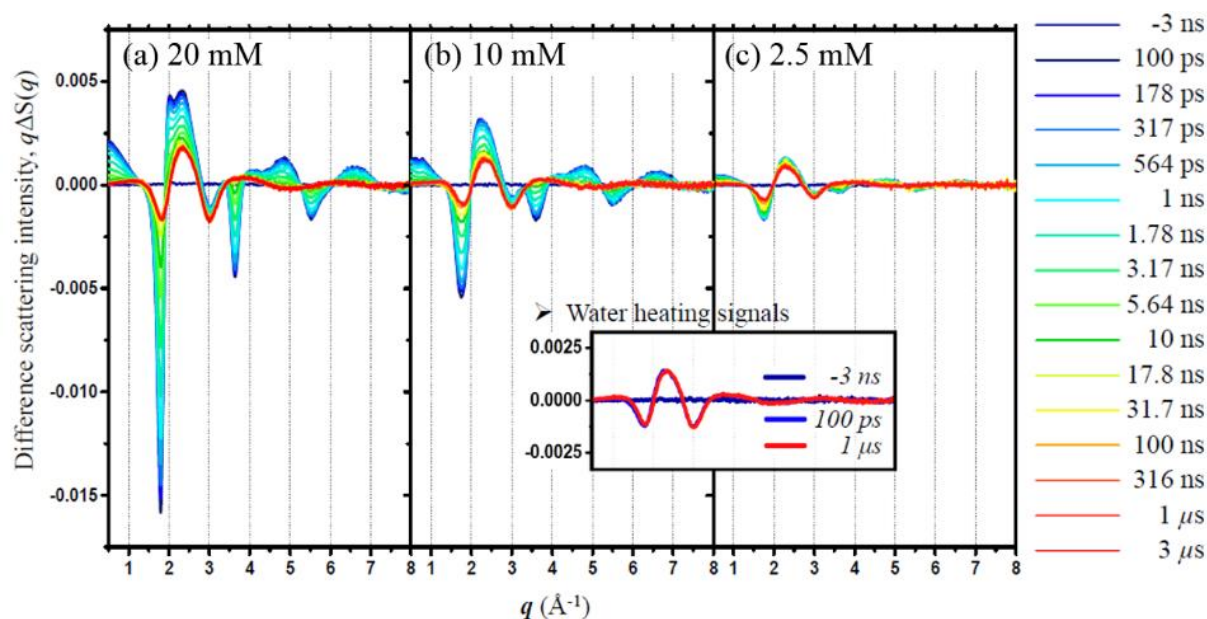


Figure. 1 Difference X-ray scattering curves at the time delays of -3 ns; 100, 178, 317, and 564 ps; 1, 1.78, 3.17, 5.64, 10, 17.8, 31.7, 100, and 316 ns; 1 μ s for (a) 20 mM (b) 10 mM and (c) 2.5 mM [Pt(terp)Cl] solution in water. Solvent heating signals at -3 ns and 100 ps were also plotted with 1 μ s difference scattering curves from 20 Mm [Pt(terp)Cl] in the inset.

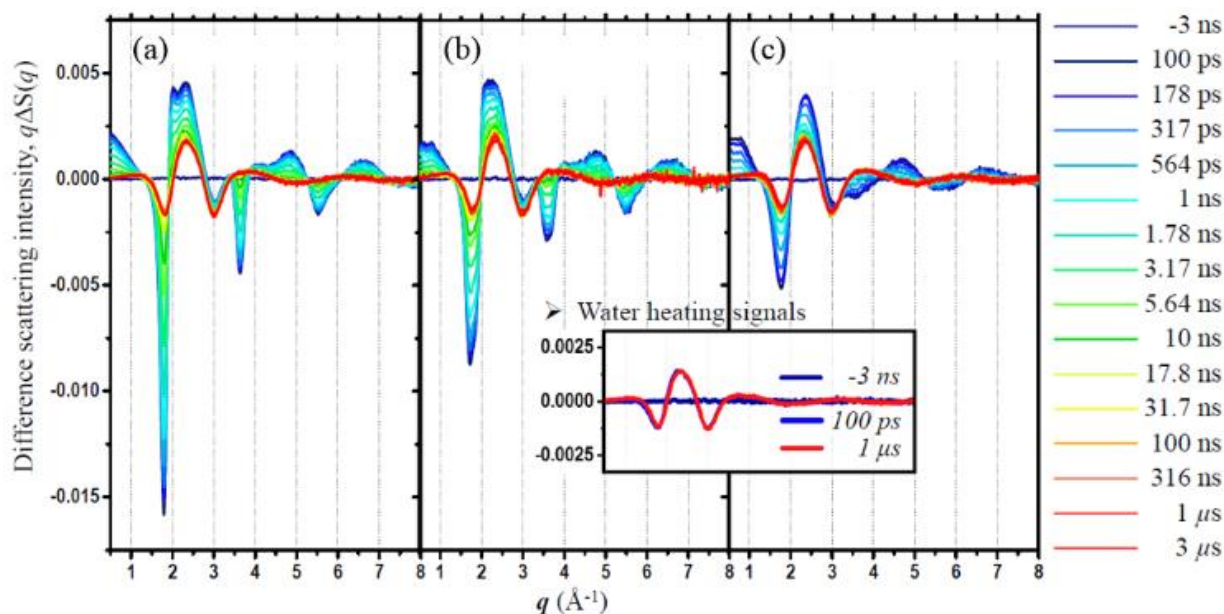


Figure. 2 Difference X-ray scattering curves at the time delays of -3 ns; 100, 178, 317, and 564 ps; 1, 1.78, 3.17, 5.64, 10, 17.8, 31.7, 100, and 316 ns; 1 μ s for (a) 20 mM [Pt(terp)Cl], (b) 20 mM [Pt(terp)Cl] with 20 mM NaCl and (c) 20 mM [Pt(terp)Cl] with 100 mM NaOH solution in water. Solvent heating signals at -3 ns and 100 ps were also plotted with 1 μ s difference scattering curves from 20 Mm [Pt(terp)Cl] in the inset.