



	Experiment title: Direct investigation of the Ce valence under pressure using Ce L ₃ - XAS to verify the valence change hypothesis of CeP system under pressure.	Experiment number: HC1990
Beamline: ID24	Date of experiment: from: 29/04/2015 to: 05/05/2015	Date of report: 2017/07/14 <i>Received at ESRF:</i>
Shifts: 12	Local contact(s): Raffaella Torchio (email: torchio@esrf.fr)	
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Report:

Cerium phosphide undergoes a unit-cell volume discontinuity without any structural phase transitions upon application of a high pressure of ~10 GPa [1,2]. This phenomenon is attributed to a change in the electronic charge distribution of the cerium in CeP, but to date no direct experimental verification for this hypothesis has been presented. Aim of the present experiment was to verify the above hypothesis using Ce L₃-edge X-ray absorption spectroscopy study under pressure. We could successfully execute such an experiment, thanks also to the implementation of a special high pressure DAC set up involving a combination of a mini and partially performed anvils made of nanodiamonds [4]. The results of the present measurements provided direct compelling evidence of an electronic transition associated with the isostructural volume discontinuity at around 10 GPa in CeP. These results should be relevant to the understanding of the phenomenon of pressure induced isostructural transitions involving unit-cell volume collapse. Main results from the present study are recently published as a communication. Details of the publication are given below.

[Experimental evidence of an electronic transition in CeP under pressure using Ce L3 XAS:](#)

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[1] A. Jayaraman, W. Lowe, L. D. Longinotti and E. Bucher, *Phys. Rev. Lett.*, 1976, **36**, 367

[2] B. Joseph, R. Torchio, C. Benndorf, T. Irifune, T. Shimmei, R. Pöttgen, A. Zerr, *Phys. Chem. Chem. Phys.*, 2017,**19**, 17526-17530