

<b>ESRF</b>	<b>Experiment title:</b> Identification of alkali-silica-reaction products in concrete samples	Experiment number: 01-02-983
Beamline:	Date of experiment:	Date of report:
	from: to:	
Shifts:	Local contact(s):	Received at ESRF:
	P. Pattison	
Names and affiliations of applicants (* indicates experimentalists):		
Dr. Erich Wieland Dr. Rainer Daehn Dr. Philippe Schaub Dr. Andreas Leemann		

## **Report:**

Alkali-silica reaction (ASR) is one of the most important deterioration mechanisms in concrete leading to substantial damages of structures worldwide. Synchrotron-based micro-X-ray diffraction (micro-XRD) was employed to characterize the mineral phases formed in micro-cracks of concrete aggregates as a consequence of ASR. This high spatial resolution technique enables to directly gain structural information on ASR products formed in a 40-year old motorway bridge damaged due to ASR.

Micro-X-ray-fluorescence was applied on thin sections to locate the reaction products formed in veins within concrete aggregates. Micro-XRD pattern were collected at selected points of interest along a vein by rotating the sample. Rietveld refinement determined the structure of the ASR product consisting of a new layered framework similar to mountainite and rhodesite.

It is conceivable that understanding the structure of the ASR product may help developing new technical treatments inhibiting ASR.

Dähn, R., Arakcheeva, A., Schaub, Ph., Pattison, P., Chapuis, G., Grolimund, D., Wieland, E., Leemann. A. Application of micro X-ray diffraction to investigate the reaction products formed by the alkali–silica reaction in concrete structures Cement and Concrete Research, 79, 49-56, 2016