

Project name: Bleaching of profiles from hart PVC

Beamtime Report

dd.mm.yyyy - dd.mm.yyyy (Date of the report to be added)

General information

Name of the rapporteur	Name of the rapporteur's organisation
Robert Wiertel	Thermoplast Sp. z o.o.
Type of research (nanotechnology/health care/chemistry etc.)	Name of the research facility
chemistry	MAX IV Laboratory
Date of the measurement, duration	Location of the event
01.10.2013	beamline I811
Facility personnel participating in the measurement	
<i>Dr. Stefan Carlson – spectroscopy measurement, Dr. Kajsa Sigfridsson - analysis</i>	

Description of the project

Research description (short summary as written in the application)
Analysis of the causes of bleaching coloured PVC profile outside. Determining methods of prevention of white spots and how to remove them. Artificial aging tests do not confirm the change of material in the comparable period of exposure to outdoor conditions.
Summary of activities (experiments performed, beamtime used, preliminary overview of results, next steps and other relevant information)
<p>The x-ray absorption spectroscopy measurements were performed (XANES and EXAFS) at the K-edge of Zn. 4 samples of components used in PVC profiles production and 9 profiles were examined. 5 kinds of profiles produced using slightly different technology were examined as produced and after 2 years used and exposed for the sunlight. Measurements were performed at beamline I811. The shape and energy position of the XANES and Fourier transformed EXAFS was analysed. Preliminary overview of results lead to following conclusions:</p> <ul style="list-style-type: none"> • All samples (except the Ca/Zn-stabilizer and green pigment) changed in the X-ray beam between first and the consecutive scans. • Edge moved to slightly lower energy (still Zn^{2+}) and the first oscillations are affected. • Photo-induced coordination changes. Also observed in the FTs of EXAFS as increase or decrease of peaks. • Concern that the first scan is also affected and the "true" plastic-spectrum was never recorded. In the analysis only first scan was considered. • Slight edge shift (+0.4 eV) to more oxidized sample after 2 years use (when comparing first scan) for AP602_RAL7016, while RAL6005 plastics were slightly

more reduced after 2 years (-0.2 eV). This apparent ox/red reflect changes in the coordination of Zn^{2+} .

- Two groups of compounds according to the edge shape (and EXAFS):
 1. Green pigment-group (AP602_RAL6005, AP670_RAL6005, dry blend)
 2. Base mix-group, (AP602_RAL3011, AP602_RAL7016, AP670_RAL3011)
- A full EXAFS analysis could has the potential to reveal detailed information of the Zn-site and the ageing process.
- The most stable plastic against weather and wind was AP670_RAL6005.

How would you describe cooperation and assistance from industrial liaison officers and national contact points while preparing and carrying out the research at large scale facilities?

Cooperation was very positive, ranging from findings concerning of test material by phase studies and their conclusions.
It is important that research found a direct impact on the quality and durability of PVC profiles produced of environmentally friendly compounds.

Other personal remarks

We hope that the results will influence the direction of our research colored PVC dryblends resistant to aging.

Annexes

Annexes

(list of annexes; meeting minutes, graphical illustrations, tables and other supplementary data)

Power Point presentation with the results of performed measurements.