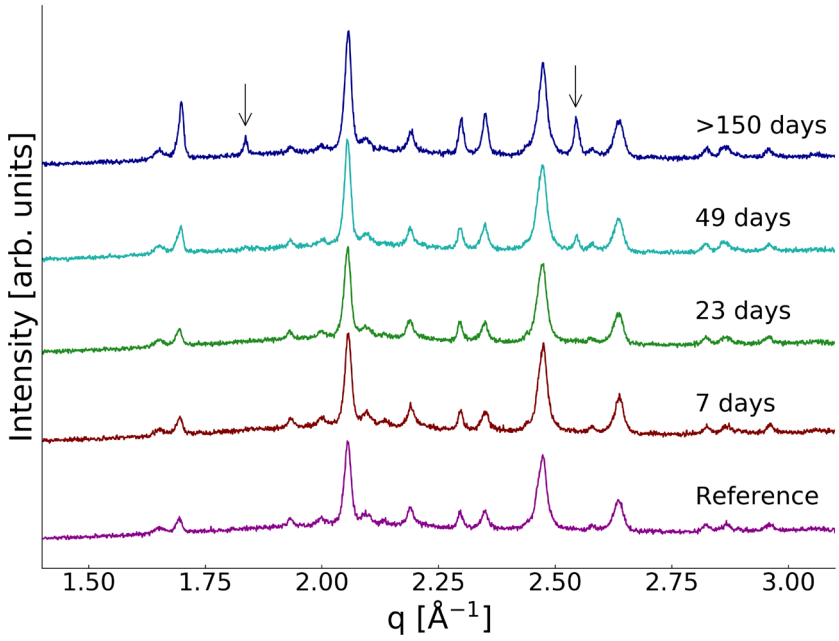
DURABILITY OF ENAMELED GLASS
IN SALINE ENVIRONMENTS

Enameled glass is used for a wide range of glazing applications, e.g., architecture, automotive and domestic appliances. Researchers from Aarhus University collaborated with VELUX A/S to examine possible degradation of enameled glass in saline conditions.

In VELUX roof windows, enameled (or "masked") glass is being used in pane constructions. Understanding the resistance of the materials towards relevant surrounding environments, such as saline conditions, is important in order to direct the material choices as well as in the validation of the technology.



Powder X-ray diffraction data collected from enameled glass samples exposed to saline conditions for specified durations. The bismuth silicate phase, Bi_2SiO_5, most likely originating from the bismuth borosilicate based glass matrix of the enamel, can be identified in all samples. After prolonged exposure to saline conditions, degradation phases can be identified, including the bismuth oxychloride phase, BiOCl. The arrows in the figure mark positions of diffraction peaks emerging from degradation products.

From the X-ray diffraction studies at Aarhus University, the formation of crystalline degradation products could be identified in the enameled glass after prolonged exposure in a saline test environment.

KEY ACTIVITIES

- VELUX provided enameled glass samples exposed to saline conditions at different time intervals.
- X-ray diffraction studies were performed at Aarhus University, Dept. of Chemistry and iNANO.
- Peak matching analysis was carried out on the powder X-ray diffraction data to identify the crystalline components.
- Rietveld analysis of the powder X-ray diffraction data was used to obtain ratios of the mixed crystalline phases.

"The work performed in this LINX project provided an important piece of the puzzle in the validation of the environmental durability of these glass enamel materials."

Simon Johnsen, Researcher,
Advanced Material Technology
VELUX A/S

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In the LINX project, researchers at leading Danish universities collaborate with scientists in industry to solve industry relevant problems using advanced neutron and X-ray techniques. The group of Bo Brummerstedt Iversen at Aarhus University contributes with their expertise in materials crystallography and diffraction techniques. The LINX Project has received funding from Innovation Fund Denmark (IFD).

AARHUS UNIVERSITY VELUX LINX Linking Industry to Neutrons and X-rays Innovation Fund Denmark