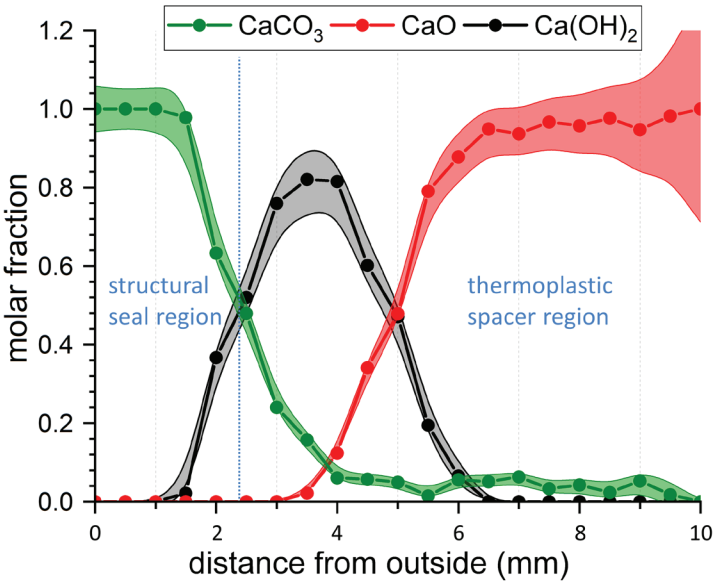
WATER IN THERMOPLASTIC SPACERS

Water can seep into many materials. The process may be slow but, given years, it all adds up and can eventually cause problems in products. Researchers from Aarhus University collaborated with VELUX to examine the ingress of moisture in thermoplastic spacers.

Thermoplastic spacers are crucial for the long term sealing of double-glazed windows. These spacers, however, pose a significant materials challenge since they are constantly exposed to wear and tear from UV-light, heat, humidity etc. A desiccant is commonly added to mitigate water uptake but, over time, the desiccant may be depleted. Understanding if and how this happens may improve design and lifetime assessment.



Molar fractions of selected crystalline compounds across a water exposed double-glazed window spacer: obtained from Rietveld analysis of X-ray diffraction data. Calcium oxide (CaO) is the desiccant.

From the X-ray diffraction studies at Aarhus University, the water exposed spacer was found to contain calcium hydroxide in the outer part of the thermoplastic spacer. This finding suggests that the calcium oxide desiccant has absorbed water according to $CaO + H_2O \rightarrow Ca(OH)_2$.

KEY ACTIVITIES

- VELUX provided water exposed and unexposed (dry) double-glazed window spacer samples to be examined and compared. The window spacers are composed of a structural seal (outward facing) and a thermoplastic spacer (inward facing).
- X-ray diffraction studies were performed at Aarhus University, Dept. of Chemistry and iNANO.
- Scanning mode X-ray diffraction was used to investigate water uptake through the spacers (from outside to inside).
- The X-ray diffraction data analysis enabled identification and distribution of crystalline compounds through the spacers.

"The work performed in this LINX project significantly contributed to validate the technology, leading to significant investments and job retention in DK."

SVERRE SIMONSEN, Director, VELUX

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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).

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