

Lucideon

UK Research and Innovation has funded a new way to densify ceramic and glass powder that reduces energy demand by more than 50% and could make UK companies more competitive.

Dense, ceramic and glass bodies can be made from oxide powder via sintering. The term may be unfamiliar, but sintering is essential in the creation of a number of material parts and products used domestically and in industry. The process involves compaction of a solid mass of powder followed by heating to initiate diffusion or partial melting, resulting in densification. Sintering is almost always the most energy-intensive step in manufacturing.

Sintering processes currently run over several hours at temperatures from 1000-1800°C, depending on the product. That's a lot of time, and a lot of energy going into the creation of materials that we can't live without. But with support from UK Research and Innovation's (UKRI) Industrial Strategy Challenge Fund (ISCF), two new processes are being developed that, in combination, could dramatically reduce the time, cost and environmental impact of glass and ceramics produced from compacted oxide powders.

The potential impact of this project is considerable, given the vast number of applications that glass and ceramics have. Ceramics and glass are manufactured widely in the UK, and used in everything from electronic components to kiln linings, jet engines to hip replacements. Faster methods of sintering, which consume less energy, will give a competitive advantage to many different British businesses, as well as benefiting the environment.

Led by [Lucideon](#), the project combines an innovative process that Lucideon had been developing – 'flash sintering', which takes much less time than traditional methods – with an equally innovative technique that was being developed at the [University of Sheffield](#) – 'cold sintering', which uses pressure to sinter glass and ceramic compacted powder at much lower temperatures (100-200°C).

As Lucideon's Head of R&D, Stuart MacLachlan, explained: "We knew that flash sintering was promising, and that it would have huge potential if it was combined with cold sintering. This could form a combined process that is both quicker and less energy-intensive, hence our decision to apply for grant funding from UKRI and work collaboratively."

With funding of £255,736 from the ISCF's [Transforming Foundation Industries challenge](#), the project brings Lucideon and the University of Sheffield together with industry partners [Knowles](#), [Vesuvius](#) and [Glass Technology Services](#). "Being industry-led means that the project is very focused," said MacLachlan. "We are looking particularly at the types of material that are of interest to our three potential end-user companies." At the same time, the project is breaking new ground: for the first time combining processes that are innovative in themselves.

The project has begun with a lab-scale feasibility study, to prove the concept that the combined methods will work effectively. If the 12-month project is successful it will be followed by activities to scale-up to industrial level.

