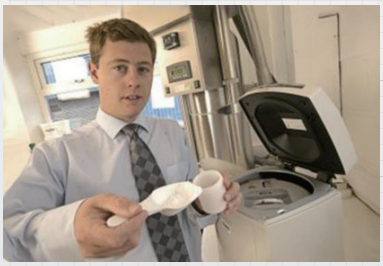
Introduction Examples

Users' Voice

Effective mixing of specialist glass powders with a high viscosity acrylic resin



Dr. Philip Frampton

James Kent Ltd
England, United Kingdom

Product in use:
*ARE-250CE**

Customer benefits

- Reliable quality mixing
- Consistent homogeneity
- Quicker process
- Improved degassing

※ *Equivalent to ARE-310*

Encounter with the ARE-250CE

James Kent (Ceramic Materials) Ltd had relied for many years on a manual mixing system for their research and quality control of specialist glass powders, but embarked on a search for a process solution that would be more effective, more consistent, quicker and simpler.

The glass powders produced by James Kent Ltd are tailored to customer need – primarily for dental fillers and restorers, they vary from 0.5 to 10 microns average particle size. For testing purposes, the glass powder needs to be mixed with a high viscosity acrylic resin monomer to check for high transparency and low discolouration – but the manual process, while well understood, continued to give problems of non-homogeneity and air inclusion, both of which preclude colour checking of the glass.

The search for an improved system led Dr. Philip Frampton to the **Thinky ARE-250CE**, which incorporates both planetary mixing and centrifugal degassing in one unit.

How ARE-250CE improved the mixing process

Tests with the Thinky equipment involved mixing 60% glass with 40% acrylic by weight in viscosities varying from "thick honey to stiff bubble gum," according to Dr. Frampton.

Empirical investigation supported by our advice rapidly determined suitable program parameters based on viscosity. These samples were then pressed and cured into standard £ 2 coin-sized discs for comparison with established colour standards.

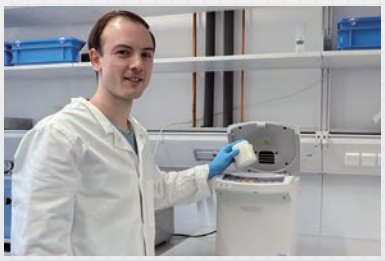
Comments from Dr. Frampton

"James Kent are one of probably only 4 or 5 companies in the world operating at the top level in this technology and we were looking to improve the mixing stage as a first step to overall improvement of our glass grinding process.
Intertronics'* expertise and supply of the Thinky mixer has allowed us to achieve that initial goal in a single operation.
Now that we have a reliable quality control process, we can move to purchase of a spectro-photometer. This will enable us to refine our operation further toward development of an even cleaner and finer grinding process."

The mixing of glass and ceramic powders into resins is a perfect job for a Thinky mixer!

* Intertronics is Thinky's distributor in U.K.
http://www.intertronics.co.uk/

Production of high-energy cathodes for lithium-ion batteries with novel electrode structure



M.Sc. Jonas Oehm,
Prof. Dr.-Ing. V. Knoblauch

M.Sc. Jonas Oehm is shown in the photo above.

Aalen University of Applied Sciences,
Institute for Materials Research, Germany

Product in use:
ARM-310CE

Research Outline

Due to the increased demand for mobile, rechargeable batteries with ever higher energy and power densities, intensive research is being conducted into modifying the electrode structure in order to increase the active mass loading. One possible approach is a three-dimensional structuring of the electrodes by using a cellular structure (e.g., a metal foam), which acts as a current collector. Due to the cellular structure, an electrically conductive structure is present within the active mass. This can increase the electrical conductivity of the electrode while increasing the integrity of the active mass layer. This should make it possible to increase the electrode thickness while reducing the amount of inactive components.

Importance of THINKY MIXER for Preparing Electrode Slurry

In the production of these foam electrodes with the highest possible active mass loading, the infiltration of the cellular structure with an electrode slurry is a decisive process step. The degree of infiltration depends to a large extent on the viscosity of the electrode slurry. In order to determine the optimum slurry composition for a given solids composition (e.g. 84 wt.% NMC, 8 wt.% conductive carbon black + graphite, 8 wt.% binder), three different cathode slurries with different solids contents were prepared using the **Thinky ARM-310 planetary centrifugal mixer** via a multi-stage process. The viscosity curve of the three slurries in Fig. 1 shows that the viscosity increases with increasing solids content. Fig. 2 shows the active mass loading of 1000 µm thick NiCr foam rounds (Ø 10 mm, 450 µm cell size) after infiltration and drying with the different slurries. With increasing solids content, the active mass loading increases. With further increase of the solid content in the slurry, an inhomogeneous infiltration of the slurry is to be expected due to the increasing viscosity. With the **Thinky ARM-310 planetary centrifugal mixer**, various slurries with different compositions could thus be produced in a very short time and a suitable composition was identified.

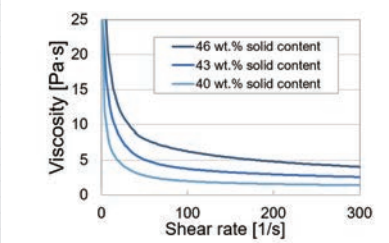


Fig. 1: Viscosity of differently NMC cathode slurries with a solid content composition of 84-8-8 (wt.%, NMC, conductive additive, binder) and various solid contents.

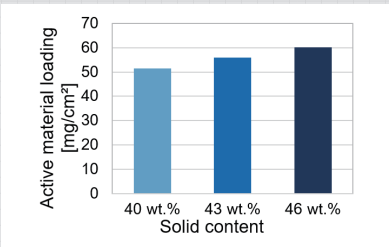


Fig. 2: Active mass loading of 1000 µm thick NiCr foams (10 mm) after infiltration with the slurries having different solid contents.