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Big bubbles no trouble

Australian research team makes bubble breakthrough

Barun Gorain counted 1.5 million bubbles during research towards his PhD

When you open the next bottle of champagne over the festive season, spare a thought for the bubbles.

As frivolous as they seem, bubbles are not simple, and getting a bubble to the correct size and shape has been one of the most daunting puzzles posed to science and engineering.

A team of research engineers at the Julius Kruttschnitt Mineral Research Centre, in collaboration with a group at the University of Cape Town in South Africa recently made significant breakthroughs in the quest for the perfect bubble, with the help of a Bubble Size Analyser designed at UCT.

It’s not champagne bubbles they’re working on, but the bubbles generated in large tanks - or flotation cells - used to separate valuable minerals at large minesite processing plants.

Using the Bubble Size Analyser, University of Queensland/JKMRC PhD student Barun Gorain discovered the importance of a new principle called ‘Bubble Surface Area Flux’ which will take the guess work out of scaling up minerals flotation plant operations.

JKMRC flotation group co-leader Dr J-P Franzidis said it was not so much the size of the bubbles that are important, but the available bubble surface area.

He said the ability to measure a bubble has enabled engineers to calculate the rate at which mineral particles float to the surface attached to the bubbles.

"A flotation cell is a highly turbulent environment, and very few people thought it was possible to measure bubbles going in all sorts of directions - but now you can."

Following the advice of one of Australia’s leading authorities on flotation, Dr Emmy Manlapig, Barun soon discovered the correlation between mineral particles and bubble surface area to develop the principle of ‘bubble surface area flux’.

Barun is believed to have counted 1.5 million bubbles for his PhD thesis which could open the door for new products and processes in a range of industries.

His work also attracted the interests of Australian and overseas cell manufacturers and mining companies at a research review meeting held in Brisbane earlier this month.

"If it wasn’t for Emmy Manlapig’s foresight and Barun’s breakthrough using the Bubble Size Analyser we wouldn’t be as advanced in our flotation research as we are today," Dr Franzidis said.

He said the technology was not only useful for minerals processing, but had a range of other applications, such as removing oil from water, in waste water processing, and de-inking in the paper recycling industry.

"It's a new way of looking at the flotation process which has been at the core of Australian mining since it was first used to separate ore at Broken Hill early this century."

Dr Franzidis said University of Cape Town researchers have approached their research into bubbles from a different angle, trying to match bubble size with particle size.

The UCT researchers are attempting to 'tailor-make' a bubble size distribution which will preferentially float a particle size distribution for a particular ore.

Dr Franzidis said research conducted at the JKMRC and University of Cape Town is being pooled in a joint international project, coordinated by the Australian Minerals Industry Research Association, aimed at optimising mineral processing plants world-wide.

He said that while the project attracted the interests of cell manufacturers, with implications for other industries, he did not expect many calls from local wine makers.

"Alas, science is still some way off from being able to measure the bubbles in champagne," Dr Franzidis said.

"Even though champagne bubbles are being continually created at the bottom of a glass, they're much too fine to measure."

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