



Development of methodologies to reduce respirable crystalline silica (RCS) toxicity

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BACKGROUND

The International Agency for Research on Cancer (IARC) has classified RCS in the form of quartz and cristobalite from occupational sources as carcinogenic for humans (category 1). The results obtained in project SILICOAT (FP7-SME-2011-285787) probed the effectiveness of the addition of substances like nanoalumina or organosilanes to block the silanol groups present on the surface of the quartz particles, virtually nullifying the toxicity of the RCS contained in the wet-processed raw materials of the traditional ceramic industries.

SCOPE AND APPROACH

The main objective of SILIFE project (LIFE14 ENV/ES/000238) is the production, this time by a dry process, of commercial quartz powders showing very little or no RCS toxicity, ready to be used as raw material in other industrial sectors which use quartz in their processes.

METHODS

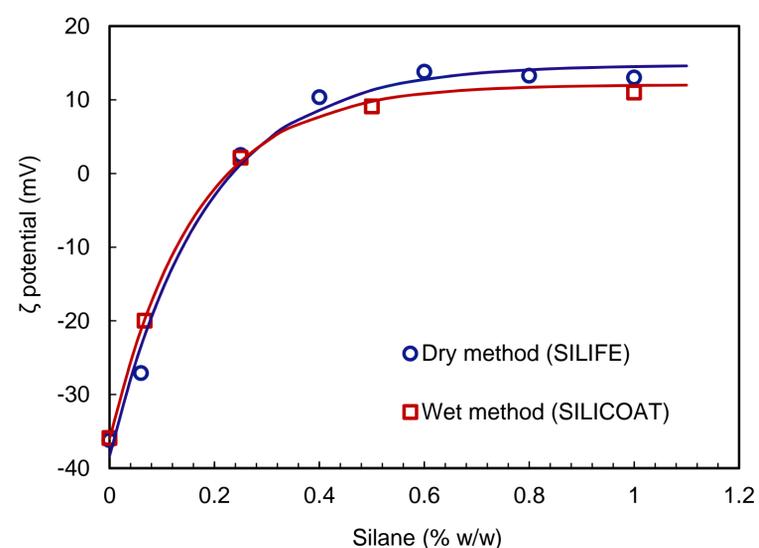
Industrial quartz powders were coated with a wide variety of organosilanes. The coating process has been performed using different high shear-rate plow mixers (lab and pilot plant).

The coating degree was assessed by measuring the ζ potential or quantifying the elemental carbon content.

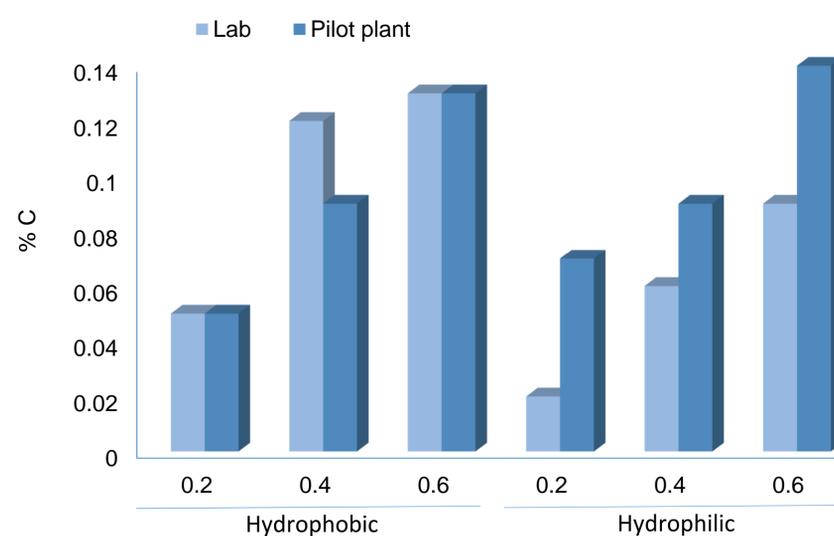


RESULTS

The results obtained by dry method (lab scale) were compared with those obtained in aqueous suspension (wet method).



A pilot plant was set up and the obtained results were compared with those obtained in the lab mixer.



CONCLUSIONS

The lab results and the pilot plant preliminary tests in the SILIFE ongoing project suggest that the developed dry method to coat quartz surface is also a very promising methodology to reduce RCS toxicity.

Therefore, a lot of end-users of quartz powders will be potentially benefited from a reduced risk associated to the exposure to RCS.