# INNOVATION IN THE CERAMIC INDUSTRY: NEW FUNCTIONALITIES FOR CERAMIC TILES

## Chaired by: Jorge Bakali

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The principal issue to be addressed in the panel debate is fostering contact or facilitating the encounter between the scientific and the industrial world, grounded on the generation of ideas for technological developments in the ceramic production sector, based on scientific studies conducted at Universities or public Research Centres.

The ceramic industry in general and the ceramic tile sector in particular have long been considered sectors far removed from research and tied to tradition.

At the present time the national ceramic industry is faced with strong international competition as a result of globalisation and, therefore, the traditional sector needs to adopt a more scientific approach, based on good research and the application of the scientific method with a view to developing new products with greater added value (new production technologies, new ceramic tile functionalities, harmonisation with the environment, etc.).

As a result, greater communication is needed and transfer of the knowledge acquired at Research Centres (Universities, Spanish National Research Council, Institutes and/or public or private Research Centres) towards the world of the ceramic industry.

Faced with these challenges, the various administrations have undertaken actions aimed at fostering contact between the world of science and the world of industry. Examples of these actions are the joint University-Enterprise research projects which have been launched, through the PROFIT programme or IMPIVA projects, within the frame of actions by the Generalitat Valenciana, the Autonomous Government of Valencia.

Other actions have also been encouraged, directed towards the incorporation of Ph.D. holders and technologists in the companies, for instance through the TORRES QUEVEDO programmes, which serve to establish communication bridges between the business sector and the Research Centres.

A new approach of note is the introduction by the Government Presidency of a very aggressive type of project, called INGENIO 2010, which includes the so-called CENIT project. The idea is to bring consortia of companies and Research Centres into contact with each other in order to undertake lines of research grounded in basic scientific knowledge (known as Basic Science) but aimed at industrial applicability, such that these lead to technological changes in products and processes in a given sector within a decade.

This measure implicitly includes the idea of making greater investments in R&D+i (innovation) in our country and this investment will mean consequential technological changes.

The significance may also be noted of promoting actions designed to bring scientific knowledge closer to the industrial world, since technological advance is underpinned, in fact, by such basic knowledge; this is of critical importance if a country is not to be marginalised technologically. An example might be that of a tree in which the trunk and the branches that bear the fruit are the technological field, while the roots that provide the tree with sustenance are scientific or basic knowledge.

Therefore, the basis for the panel debate will centre on measures and actions for fostering links between scientific knowledge and the industrial world, and in particular with ceramics.

On the other hand, some of the research carried out at the Research Centres (Spanish National Research Council, Universities, other technology centres) will be highlighted, which could be of interest to the industrial ceramic floor and wall tile sector; these are based on the introduction of new technologies for the application of coatings onto ceramic bodies, providing these with new functionalities and improved characteristics. These new technologies include, for instance, plasma-based techniques, laser technology, thermal projection, etc.

Research is further being carried out at present on materials with new surface properties, which can contribute additional functionalities to ceramic tiles, such as optical, electric or mechanical properties, among others, while there have already been developments in the tile sector in regard to photocatalytic properties, bactericide tiles, fluorescent, tiles with electric and antielectrostatic properties, tiles with thermal properties, tiles with metallised effects, etc.

Research has also been conducted with a view to minimising environmental impacts and acting with more respect for the environment. In this context, studies have been performed of new ceramic product formulations with the introduction of wastes generated by the own sector (eco-tiles), as well as new renewable energy sources (photovoltaic ceramics).

Other lines of work deal with so-called bioceramics, which are of great social interest, since they allow developing materials that can be implanted in human tissues, corneas, bones, etc., or enable treating certain diseases through these, less aggressive materials.

Thus, in this field of action, the possibilities will also be discussed of the contributions that science can make to the industrial ceramic sector, as well as the mechanisms and courses of action proposed by the administration.

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