INNOVATIVE PROCESS TO OBTAIN METAL NANOPARTICLES FROM COCOA RESIDUE

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RESUMEN

Researchers at the University of Alicante have developed an innovative process to revalorise waste from the chocolate industry and synthesise metal nanoparticles from cocoa shells, in addition to obtaining other high added-value compounds such as water-soluble proteins, antioxidants and lignocellulosic material.

The system allows selenium-doped carbon quantum dots and zinc oxide nanoparticles with interstitial zinc to be obtained using a sequential microwave-assisted process. This process lowers nanoparticle production costs, reduces the number of steps and produces higher extraction yields.

This system is of particular interest to the chocolate industry as it allows the reuse of its main waste product. It is also of interest to the chemical, cosmetics, food, medical and pharmaceutical industries.

VENTAJAS Y ASPECTOS INNOVADORES

ADVANTAGES OF THE TECHNOLOGY

- **Sustainable synthesis** method that incorporates the principles of the circular economy by taking advantage of a waste product from the chocolate industry.
- It makes it possible to obtain **metallic nanoparticles of high value** for industry, such as selenium and zinc oxide nanoparticles.
- The process is carried out in an **aqueous medium**, thus avoiding the use of organic solvents, which are common in this type of process.
- Significant **reduction in nanoparticle production costs** by increasing extraction yields, reducing the number of stages and requiring less energy.
- The process also makes it possible to obtain **other multifunctional products with great potential**, such as water-soluble proteins, pectin, antioxidants and lignocellulosic material.
- The nanoparticles obtained have a **unique structure and an exceptional particle size**, making them more interesting for industrial application than other structures obtained by other processes.

INNOVATIVE ASPECTS OF THE TECHNOLOGY

The main innovation of the technology is its **capacity to take advantage of a waste** generated in large quantities by the chocolate industry **and obtain multiple by-products with high added value**. Among these, **zinc oxide and selenium nanoparticles** are of particular interest to the nanotechnology industry.

The process is substantially more interesting than the existing ones, as it is much more sustainable, has a lower production cost and the resulting products have more interesting properties.

APLICACIONES DE LA OFERTA

The technology is of direct application for **chocolate production** companies as it allows them to treat their waste and generate high added-value products.

It is also of interest to **waste treatment** companies and, in general, to **chemical, pharmaceutical, medical, food, materials and cosmetics companies**, as the products obtained are of great use in these industries.

In particular, selenium and zinc oxide nanoparticles are very interesting compounds for application in the **nanotechnology industry**.

COLABORACIÓN BUSCADA

Companies interested in acquiring this technology for **commercial exploitation** are sought:

- Patent licensing agreements.
- R&D project agreement (technical cooperation) to undertake projects related to the technology.