Institut "Jožef Stefan" Ljubljana, Slovenija

TECHNOLOGY OFFER

METHOD FOR THE DEPOSITION OF VANADIUM OXIDE NANOPARTICLES

Fields of use

CAD/CAM, CAE systems, Bateries, Power supplies, Other analytical and scientific instrumentation, Other electronics related (including alarm systems), Micro and nanotechnology related to electronics and microelectronics, Surface treatment (painting, Galvano, polishing, CVD, …), Metals and alloys, Conductive materials, Nanomaterials

Current state of technology

Under development/lab tested

Type of cooperation

Technical cooperation and license agreement to apply the technology

Intellectual property

Patent(s) applied for but not yet granted

Developed by

Jožef Stefan Institute

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Summary

A Slovenian research institute has developed a novel method for the deposition of vanadium and other metal oxide nanoparticles. The method is simple and results in unimodal nanoparticle size distributions. The institute is looking for producers of lithiumion batteries, vanadium redox batteries, catalysts, microbolometers, ethanol sensors and other electronic devices for technical cooperation agreement and license agreement to apply the technology in their production.

Description of the invention

The currently available methods of synthesising metal oxide nanoparticles typically include one or more of chemical synthesis, mechanical grinding, colloidal precipitation and gas-phase nucleation and growth (aerosol process). Among the existing techniques, gas-phase synthesis has benefits because of the purity of the resulting product, but the control of the distribution of particles and the rate of aggregation are problematic. Considering transition metal oxides, particularly vanadium pentoxide nanoparticles attract attention due to their unique properties. High-purity particles of vanadium pentoxide are used in lithium ion batteries, vanadium redox batteries, catalysts, microbolometers, ethanol sensors and other electronic devices as well as agents against corrosion.

A Slovenian research institute has developed a novel method for deposition of vanadium oxide (V2O5) and other metal oxide nanoparticles using atmospheric pressure plasma. The method can be applied with any atmospheric pressure plasma (jet) with an inlet feed of gas and a metal oxide macropowder dispersed in a liquid. Nanoparticles of any metal (besides vanadium (V) for example also niobium (Nb), ruthenium (Ru), manganese (Mn), cobalt (Co) and nickel (Ni)) oxide which is dispersible in water or any other simple liquid, can be synthesised using this method. The technology has been developed at the leading Slovenian research institute which is active on a broad spectrum of basic and applied research. The research group has a lot of experience in plasma systems and surface engineering.

The research institute is looking for industrial partners for technical cooperation agreement and license agreement. Industrial partners should be companies that produce lithium-ion batteries, vanadium redox batteries, catalysts, microbolometers, ethanol sensors and other electronic devices on which metal oxide nanoparticles need to be deposited. Within the technical cooperation agreement, the partner sought shall jointly with Slovenian institute scale up the method and employ the method in their production process. If the partner successfully implements the method in their production process, they will be invited to sign a license agreement.

KONZORCIJ ZA PRENOS TEHNOLOGIJ IZ JRO V GOSPODARSTVO

EUROPEAN UNION
EUROPEAN REGIONAL DEVELOPMENT FUND

REPUBLIC OF SLOVENIA
MINISTRY OF EDUCATION, SCIENCE AND SPORT

The investment is co-financed by the Republic of Slovenia and the European Union under the European Regional Development Fund.

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Main Advantages

Compared to other techniques the method is effective, simple and metal oxide nanoparticles can be directly deposited onto temperature-sensitive substrates like plastics.
The method has better control of the purity, the crystallinity and the particle size distribution of the vanadium and other metal oxide nanoparticles.

The method results in unimodal particle size distributions. The plasma prevents or reduces nanoparticle agglomeration before adhering to the substrate.

Partner Sought

Type: Companies that produce lithium-ion batteries, vanadium redox batteries, catalysts, microbolometers, ethanol sensors and other electronic devices on which vanadium and other metal (niobium, ruthenium, manganese, cobalt and nickel) oxide nanoparticles need to be deposited.

Role: The role of partner sought is to employ the method in their production process within a technical cooperation agreement. If the partner is able to implement the method successfully, they will be invited to sign a license agreement.

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