

Partnering Opportunity

Profile status : Archived

Technology Offer

Molybdenum nanowires for the production of touchscreen materials and as starting materials for the preparation of lubricants and catalytic membranes

Summary

A Slovenian research institute has developed a procedure for synthesizing molybdenum nanowires. The procedure is efficient, low-cost and scalable. Molybdenum nanowires may be used in various applications, including lubricant, catalysis or touchscreen technology. The researchers are looking for industry and research partners for license or technical cooperation agreements.

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Details

Description

Transition metals have a high technological utility value: molybdenum is used in applications accompanied by intense heating, such as the aircraft industry, electric contacts and industrial engines; it is also widely used in steel alloys to improve corrosion resistance. By developing nanomaterials, new properties are achieved and molybdenum nanostructures and its derivatives can be used in various applications, including lubricant, catalysis or touchscreen technology.

Slovenian researchers have developed a method for a synthesis of molybdenum nanowires, having a diameter below 1 micrometer. Such nanowires are prepared from molybdenum sulphide iodide and result in chemical composition as metals (molybdenum). Slovenian researchers can adjust the process in such a way, that carbides, nitrides or sulfides are the final product, which affects the properties of material.

The method for producing molybdenum nanowires is carried out in a reaction vessel (such as a quartz tube) which is aerated with a mixture of gases consisting of argon as carrier gas and hydrogen as a reducing agent. The conversion is carried out at temperatures above 700 °C.

Slovenian researchers have produced 100 mg of molybdenum nanowires in one batch using the presented method, but the procedure is scalable.

Application:

Reduced size and large length-to-diameter and surface-to-volume ratios make molybdenum nanostructures and its derivatives technologically applicable in various devices and applications (e. g. nanoelectronics, composites).

Applications include, but are not limited to, metal lubricants, touchscreen materials and catalysts in membranes with selective permeability.

The researchers are among the leading scientists in their respective departments, and regularly publish in high-impact scientific journals; they have experience in working in small-scale laboratory settings. They are experts in the field of inorganic and analytical chemistry, synthesis of new inorganic materials with special properties, and nanotechnology.

Type of cooperation and partner sought:

Since the technology aims to reach its full potential in an industrial setting where such nanomaterials are needed, industrial or other research partners are sought. The technology is in the field of new materials, therefore technical cooperation is sought in order to facilitate continuous development rather than only routine production. Particularly welcome are partners in developing procedures for mass production of the starting material, molybdenum sulfide iodide.

Slovenian researchers are also interested in licencing patented method to industry or SMEs, which are looking for new nanomaterials to apply them to their products.

Advantages and innovations

Several different techniques and ways of synthesizing nanowires of transition metals are known, yet no method has been described for a synthesis of macroscopic (large) quantities of these structures by chemical conversion by heating in the presence of hydrogen.

Slovenian scientists have developed efficient, low-cost and scalable method to fabricate pure molybdenum nanowires. In the presented technology, molybdenum sulphide iodide in nanowire form are treated in a quartz tube aerated with argon followed by aeration with a mixture of argon and hydrogen. This is followed by heating above 700°C. Following a cooling step, the material is recovered and consists of molybdenum nanowires.

Stage of development

Available for demonstration

IPR Status

Patents granted

Comment Regarding IPR status

Patent granted in Slovenia and PCT filed

Profile Origin

National or Regional R&D programme

Keywords

Technology

02002016	Microengineering and nanoengineering
02007010	Metals and Alloys
02007024	Nanomaterials
03004002	Inorganic Substances
05005	Micro- and Nanotechnology

Market

08001014	Lubricants and functional fluids
08001016	Commodity chemicals and polymers
08001017	Industrial chemicals
08001020	Electronic chemicals

NACE

M.72.1.9	Other research and experimental development on natural sciences and engin
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Network Contact

Issuing Partner

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Open for EOI: **Yes**

Dissemination

Relevant sector groups

Materials

Client

Type and Size of Organisation Behind the Profile

R&D Institution

Year Established

1949

Turnover

20 - 50M

Already Engaged in Trans-National Cooperation

Yes

Languages Spoken

English

Client Country

Slovenia

Partner Sought

Type and Role of Partner Sought

Manufacturers and developers of lubricants, touchscreen materials and catalytic membranes, but also other industrial and research partners, interested in nanowire technology are sought.

The researchers are offering license agreements to industry or SME, interested in applying the patented method to their products.

Regarding the technical cooperation agreement sought, the Slovenian scientists would like to find a partner for the further technological development, by improving the existing method. Particularly welcome are partners in developing procedures for mass production of the starting material, molybdenum iodide.

Type and Size of Partner Sought

SME 11-50, University, R&D Institution, SME <10,>500 MNE, 251-500, SME 51-250, >500

Type of Partnership Considered

License agreement
Technical cooperation agreement

Attachments
