KNOW-HOW IN CARBON MATERIALS AND ENVIRONMENT

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ABSTRACT

The Carbon Materials and Environment research team has a deep know-how and expertise in carbon materials and its relation to environment. Carbon materials, porous materials, zeolites, catalysis and other research fields are mastered by this research team. More than 185 research projects have been carried out regarding this areas. Projects already developed are both for industry and for other research institutions. Their know-how and expertise is offered to companies interested in developing projects related to the above stated areas.

TECHNICAL DESCRIPTION

The Carbon Materials and Environment research team carries out its activities at the Department of Inorganic Chemistry of the University of Alicante. With a team of 27 people and 185 research projects done or in development, it possesses a wide research experience in the fields of porous materials and heterogeneous catalysis, with special dedication concerning environment.

The CME research group carries out research and has a deep expertise and know-how in the following areas:

1. Carbon Materials:

- Preparation of activated carbon and carbon molecular sieves.
- Preparation of carbon fibres and activated carbon fibres.
- Preparation of conformed materials (briquettes, pellets).
- Preparation of carbon-ceramic composites.
- Preparation of carbon-polymer composites.
- Electrochemical application of carbon materials.

2. Environment:

- NOx and SO2 removal from stationary sources.
- NOx and soot removal from Diesel exhaust.
- VOC removal.
- Gas separation.
- Pollutant removal in aqueous phase.
- Biogas upgrading by CH4 dry reforming.

3. Catalysis:

• Carbon as catalyst support.

• Heterogeneization of metal complexes.

• Characterization of catalysts.

• Transient kinetic studies.

• HC-SCR deNOx.

• Hydroformilation.

• Asimmetric synthesis.

• Oxidative dehydrogenation of ethylbenzene to styrene over carbon materials.

4. Energy storage:

• High pressure hydrogen and methane storage.

• Electrochemical storage of hydrogen.

• Supercapacitor.

5. Zeolites:

• Synthesis and characterisation.

• Zeolites supported on carbon materials.

• Zeolites as catalyst supports.

6. Characterisation of Porous Materials:

• Adsorption.

• SAXS and microSAXS.

• Neutron scattering.

• FTIR.

7. Pitch:

• Characterisation and applications (fibers and composites).

RESEARCH FIELDS OF INTEREST TO THE INDUSTRY

The Carbon Materials and Environment research group of the University of Alicante is working on following research fields which could be of interest for industry:

- Hydrogen storage in porous materials.
- Methane storage in porous carbons.
- Materials for supercapacitors.
- Porous materials for pollutant removal in gas and liquid phase.
- NOx and soot removal from Diesel exhaust.
- Catalysts for pollutant removal.
- Catalysts for fine chemistry and synthesis of chemical products.
- Materials characterization through different techniques (spectroscopic, thermal analysis, mass spectrometry, gas adsorption, mechanical properties, etc.).

TECHNOLOGY ADVANTAGES AND INNOVATIVE ASPECTS

The research team has a strong expertise in preparation of porous materials such as porous carbons, zeolites and mesostructured solids and supported catalysts and, specially, in their characterization using a wide range of techniques, from conventional ones such as gas adsorption and thermal analysis techniques, to small angle scattering or diffraction. Because of the deep know how and expertise achieved, high level performance of this activities is offered.

CURRENT STATE OF DEVELOPMENT

The Research Team has a laboratory to make all studies and a pilot plant to develop scaling up of processes if they are required.

MARKET APPLICATIONS

• Carbon materials.

- Catalysts. Synthesis and design of catalysts. Testing of designed systems. Customizing and improvement.
- Environment, emission reductions, particles, filters, etc.
- Energy.

COLLABORATION SOUGHT

The Carbon Materials and Environment group is interested in transferring its knowledge and know-how.

The partners sought are industries with interest in developing projects regarding the areas of expertise stated below.

The cooperation possibilities sought are:

- Technical cooperation: To adapt a technology for a new application or to develop a technology to meet new market needs. Co-development of products and other technological partnerships in order to meet customer's needs.
- Technical assistances: Testings, trainings, works to ensure effective start-up of projects.
- Technical consultancies, technical trainings and advice on the use of new processes are also offered.
- Licensing Agreements of the patents granted by the Research Team.
- Financial resources to set up research projects related to the fileds of expertise stated.

INTELLECTUAL PROPERTY RIGHTS

Some patents are granted regarding this fields of research. For example:

- Acylation of an organic group over a zeolite.
- Procedimiento de síntesis de sialones mediante nitruración de carbones minerales y grafito.
- Mesostructured zeolitic materials, and methods of making and using the same.
- Procedimiento para la recuperación de germanio en disolución mediante carbón activo.
- Procedimiento para la obtención de carbones activados mediante activación química con hidróxido sódico, hidróxido potásico o sus mezclas.
- Procedimiento para la obtención de carbones activados mediante mezcla física de precursores carbonosos con hidróxido sódico, hidróxido potásico o sus mezclas.
- Compósitos de carbón para la reducción de óxidos de nitrógeno, procedimiento para su preparación y aplicaciones.
- Copolímeros de olefina y n-(alcoxiarboniloxi)maleimida, su obtención y empleo para proteger grupos amino.
- Porous carbon structures and methods.
- Adsorbente para la retención de SO2 en fase gaseosa a baja temperatura, procedimiento para su preparación y aplicaciones.
- Proceso de floculación para la recuperación de germanio en disolución.
- Método para la tinción selectiva de pasta de cemento presente en morteros y hormigones.

MARKET APPLICATION (5)

Footwear and Textile
Pollution and Environmental Impact
Materials and Nanotechnology
Chemical Technology
Transport and Automotive