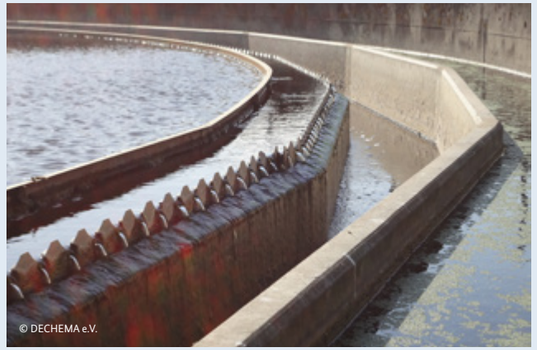
Materials for Further Applications in Water Technology

In order to achieve the goal of a sustainable water management, material developments and processes are being pursued beyond the main focus topics. Topics such as saving potentials in water management, improved environmental compatibility of materials, removal of pollutants as well as optimization of processes and technologies already used in water management will be addressed. For this reason, the funding measure supports additional projects in the following areas:

- Reduction or removal of microplastic in water cycles
- Coatings or surface modifications to reduce or avoid fouling and scaling.
- Material developments to save and improve the environmental compatibility of excipients
- Hybrid materials or so-called „multi-purpose materials“



Secondary clarifier of a waste water treatment plant

BMBF Funding Measure

The funding measure “Materials for a sustainable water management – MachWas” of the Federal Ministry of Education and Research (BMBF) supports the research and development of materials for a sustainable water management. The important resource water has to be protected and conserved for future generations through sustainable, environmentally compatible, economic and social developments.

The interdisciplinary field of materials science and technology plays a key role here. Material and material developments contribute to the solution of specific technological, ecological and social problems.

The research and development projects are to contribute to minimising water consumption and maximising water availability by means of innovations and to provide effective impulses for sustainable management of water resources through water treatment and extraction technologies.

In the MachWas funding measure 13 collaborative projects involving 75 project partners are funded in the following thematic fields:

- Materials for membrane processes
- Adsorption materials
- Materials for oxidative and reductive processes
- Materials for further applications in water technology

In the four thematic topics, the MachWas funding measure addresses a broad spectrum of materials for sustainable water management. The development of which is supported by a multidisciplinary field of contributors from research institutions and various industrial sectors. For professional interlinking and scientific support of the projects the networking and transfer project MachWasPlus is being funded.

www.machwas-material.de/en

Networking and Transfer Project / Contact

The networking and transfer project MachWasPlus will provide professional support and intensive networking possibilities for the collaborative projects of the funding measure. A further goal is the processing of the MachWas results for users in the fields of water treatment, wastewater treatment, water utilisation efficiency and groundwater protection/remediation. The tasks of the networking and transfer project are among others:

- Central point of contact for all actors involved in the funding measure
- Establishing cross-cutting themes
- Networking with relevant (inter)national support measures and activities
- Organisation of central events of the funding measure (status seminars, expert discussions)
- Establishment and maintenance of a public website for the funding measure
- Production and publication of brochures, flyers and other information material
- Processing of the results to support their subsequent exploitation

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BMBF Funding Measure

MachWas

MATERIALS FOR A SUSTAINABLE WATER MANAGEMENT

SPONSORED BY THE

Federal Ministry of Education and Research

The Resource Water

Water is the most important resource for mankind, nature and the economy. Although it is constantly renewed, it is also limited and cannot be produced or replaced by other resources. Due to climate change and population growth, as well as economic activities such as energy production, industry and agriculture further stress will be placed on the water deposits in the future. Increasing water pollution is expected to result from pollutant emissions, excessive water use and extreme climatic conditions such as floods and droughts. As a result, the ecological and chemical equilibrium of water bodies is endangered. These problems must be solved in order to preserve the vital resource water for mankind, nature and the economy and to protect human health. Only through the development of innovative technologies and materials will it be possible to use existing water resources in an ecologically and economically meaningful way.

Materials for a Sustainable Water Management

The integrated management of all artificial and natural water cycles, taking into account the long-term protection of water as a habitat respectively as a central element of habitats and as a basis for life is referred to as sustainable water management. Key concepts in this context are adapted waste water technology, multiple use of water, closing of material and water cycles, soil and groundwater protection, reduction of water consumption and an understanding of waste water as a resource as well as the elimination of anthropogenic pollutants from it. Technological solutions with material-specific approaches play a central role here, for example in water treatment, wastewater treatment or groundwater remediation. New concepts form the basis for further progress in the development of modern and sustainable water technology.

www.machwas-material.de/en

Materials for Membrane Processes

Membrane processes are important in water purification and treatment. Micro-, ultra- and nanofiltration as well as reverse osmosis have established themselves as alternatives to conventional separation processes in water purification and are now regarded as key technologies for recycling and the closure of water cycles.

The following research and development tasks will be addressed in the funded projects to improve the membrane processes:

- Increase selectivity without limiting productivity; adjustable separation limit
- Increased permeate flows due to more open membrane structures
- Increased chemical, mechanical and thermal stability
- Integration of additional functions or structuring for selective separation of specific substance classes
- Specific surface modification or immobilization of e. g. enzymes, proteins for the elimination of trace substances or other substances
- Development of ceramic membrane geometries with higher volume-specific membrane area for the reduction of the specific membrane costs

Nanofiltration membrane plant for desalination of oil-containing waste water

Adsorbent Materials

In addition to filtration, adsorption plays an important role in water purification and treatment. Water pollution with organic, endocrine and persistent substances (e. g. drugs and their metabolites) is of particular concern. Adsorption materials can help to bind these substances and thus remove them from the water cycle.

To solve this problem, adsorptive methods are investigated in the funded projects and the following material developments are pursued:

- Abrasion-resistant, regenerative, impregnable adsorbent materials
- New sorption materials: e. g. biobased materials and carbon based nanomaterials
- Adsorption materials for heavy metal separation, separation of pharmaceutical trace substances, degradation of micropollutants and recovery of valuable substances

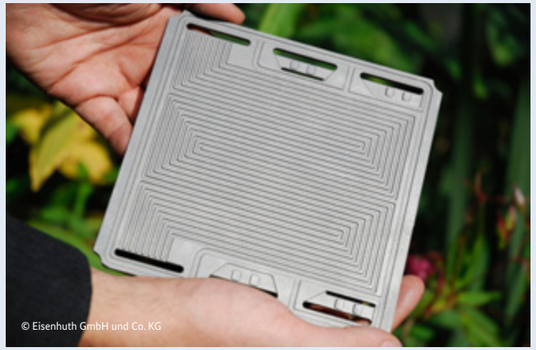
Drainage through Ferrosan geotubes

Materials for Oxidative & Reductive Processes

Newly developed materials and alternative technological concepts play a central role in the sustainable use of the resource water. Innovative technologies such as oxidative and reductive processes are aimed at the conversion of critical substances. By means of chemical reactions, these substances will be transformed into less critical substances and in some cases permanently immobilized. Due to the large number of different substances usually present in process water, waste water and groundwater, the selectivity of oxidative and reductive processes is of great importance in order to enable a targeted degradation in water.

For example, the funded projects focus on the following objectives:

- Material developments that enable increased activity and/or selectivity
- Material developments in the field of electro- and photochemical processes
- Development of catalysts that contribute to an increase in selectivity, activity and kinetics of reactions



Electrode with flowfield structure from the project RADAR