BIODAM

Inhibitors of Biofilm Damage on Mineral Materials

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http://biodam.biogema.de/

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What is BIODAM?

BIODAM is a European multidisciplinary research and development project to identify and inhibit biofilm damage on cultural heritage monument surfaces exposed to environmental and biogenic hazards.

The problem:

THE LOSS TO THE BUILT HERITAGE BY BIOLOGICAL GROWTH

Biofilms are thin and sticky layers of microbes growing on any kind of material. They are stimulated on the surfaces of buildings and monuments by air pollution. These biofilms create disfiguring stains, penetrate into the surface and can lead to substantial material loss.

BIODAM aims to eliminate biofilms on stone material by the combination of physical and chemical treatments leading to success at minimal concentrations of biocides.

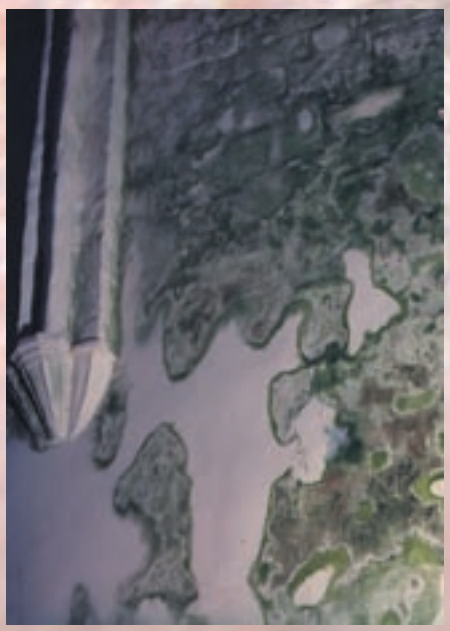
Goals of BIODAM

1. Identify the damage potential of biofilms. That is:
   - •Physical damage
   - •Chemical damage
   - •Aesthetic damage
2. Find ways to inhibit biofilms
3. Keep mineral surfaces clean for extended time periods

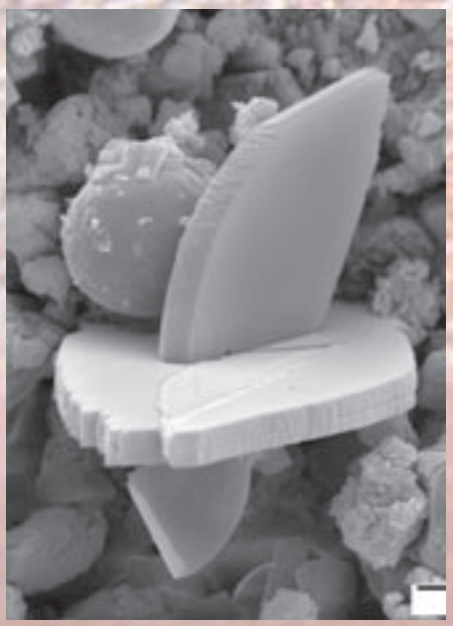
Scientific and technical approaches of BIODAM

Photodynamic therapy has been developed as a novel treatment for cancer. Similar combined techniques will be developed by BIODAM for the treatment of damaging biofilms on buildings.

Minimal concentrations of biocides are combined with photodynamic activation in order to reduce environmental and health hazards



The interior of the medieval church of Bardewisch (Weser, Germany) carries a dense algal and fungal biofilm on the plaster. The substrate disintegrates through biofilm growth. Bricks not covered by plaster undergo serious lesions by microbial growth.



Biomineralisation products of rock eating biofilm communities on Carrara marble. The marble is eaten away and new minerals of calcium oxalate are precipitated instead. The fungal cell above the scale bar measures 3 µm and may have initiated a biopit.

A sad angel on the cemetery of Nunhead City (London). The marble sculpture is covered by a film of algae, cyanobacteria and fungi. The fungi can only be visualised on photomicrographs, while algal and cyanobacterial growth is evident.

Technology of the future fo

BIODAM:

- represents a novel approach to combine biocides, cell permeabilisers, pigments and polysaccharide inhibitors with light activated protection processes
- assesses and controls environmental and health hazards of treatment
- monitors the efficiency of treatment.

Skills and competences combined under the roof of BIODAM:

- Mineralogy and Petrology
- Physics and Chemistry
- Microbiology
- Environmental and Material Ecology

Through the participation of:

- Stakeholders
- Experts from University and Applied Research Institutions
- Consulting and Treatment SMEs
- Governmental Historic Heritage Agencies
- A selection from North to South among the EU member states
- Building conservation

Sandstone sculpture from a temple in Thailand. A strongly pink coloured biofilm covers the whole figure. Several disfiguring biopits are visible. The sculpture elements can be distingished clearly from the bioerosive pattern. The biopits are incised by endolithic lichen and fungi. Disfiguring biofilms may appear in all colours of the rainbow. (The photo is used as a background of the leaflet).

Expected impacts of BIODAM

- Development of methods for more environmentally-friendly treatment of biological growth on buildings
- Mitigation of health and safety risks for those conserving the built heritage
- Compatibility with commercial restoration products
- Minimise the loss to the built heritage through the action of biofilms
- Technology transfer from medical and agricultural sciences to cultural heritage conservation
- New cleaning techniques in order to avoid massive post-treatment biofilm growth

Intense growth of green algae on sandstone sculptures at Stirling Castle. These figures, thought to have been carved by French masons, are on the exterior of the Palace building (1540-42) of James V, one of the earliest and finest Renaissance buildings in Britain. They are under severe attack by algal and fungal biofilms causing biologically enhanced sanding, pitting and exfoliation.

or conservation of our past

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