

BIODAM – New techniques to inhibit growth of damaging biofilm communities on building materials and monuments.

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Building materials such as stone, bricks and concrete or clay based roof tiles, mortars and especially all new materials for insulation and damming of humidity often contain organic compounds and are very susceptible to growth of sub-aerial biofilms creating an anaesthetic biopatina. Chemical and physical biodeteriorative forces, phenomena and processes further create damage on old and new buildings. Depending on the environmental conditions water retention and penetration the surface biofilms may transform into networks going deeper into the material (biodictyon). Biocide impregnation of new materials and biocide treatments of monuments create health and environmental hazards. Thus research and development of new applications and treatments must concentrate on a minimal use of the least dangerous biocide substances. The latter must be as firmly as possible integrated into the materials. Otherwise very serious hazards may evolve. In this contribution a combined treatment by biocides (compounds toxic for living organisms), so-called permeabilisers (compounds of low toxicity but making cells and cellular EPS envelopes penetrable for biocides), and physical (light) induction of the activity of both compound groups are described. The development of such techniques is the topic and main objective of an R&D team supported by the cultural heritage program of the EU under the project name BIODAM. Research institutes of universities, several applied material and biotechnology research institutes of governmental character and SME's combine their skill under guidance and discussion with Conservation institutions such as Historic Scotland and ICOMOS. A brief survey is given of potential techniques as well as on the damage factors, responsibility and cost of repairing biofilm damage related to buildings with stone surfaces (e.g. Neue Pinakothek, München). An outlook is given on climatic situations under which biocide treatments are useful or should be avoided because due to climatic conditions the treatments would not be effective. A new approach to the serious biofilm and biodictyon problems of the marbles of the Acropolis monuments at Athens is suggested on the basis of the new developments.