



Biodeterioration of cementitious matrix by fungi

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Micro organisms – bacteria and cyanobacteria, fungi, algae, and lichens - are able to grow on building materials: concrete, wall plastering, stone. . . . They are liable to degrade material properties: from an alteration of aesthetic aspect to a reduction of its service life. Biodeterioration mechanisms are complex and not yet absolutely understood. Usually, the biodeterioration is caused by various processes: physical (e.g.: hyphae penetration inside the matrix) and chemical deterioration (e.g.: acid production). The biodeterioration is enhanced by environmental factors such as freeze/thaw cycles. Hence, to control and to act efficiently against deterioration by micro organisms, it is necessary to have a better understanding of those mechanisms.

The aim of this study is to set up an accelerated laboratory test in order to study biodeterioration of a cement paste by fungi. The most complex stage is to obtain in some months the same effects produced in some years in natural environment, that is to say in term of matrix weathering and fungal development. Two fungal strains were chosen for the study: (i) *Alternaria alternata*, responsible of physical deterioration instead, and (ii) *Aspergillus niger*, an acidogenic fungi which is representative of chemical deterioration instead. Relating to the matrix we focus on cement paste specimens. In order to promote fungal development, a decrease of pH matrix is needed. We performed an accelerated weathering of specimens: some are carbonated and others are carbonated and then leached. We compare fungal growth on cement specimens according to weathering treatment performed.

In order to study minerals alterations during biodeterioration test, DRX, ATG-TD analyses and MEB observations are performed. Biomass quantification is carried out with ergosterol and proteins assays. These analyses would allow us to compare and quantify two way of deterioration: physical and chemical.