

Study of the Biodeterioration of some Stained Glasses by the Fungus *Stemphylium botryosum*

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Abstract

Stained glasses are widely used in windows of the buildings and exposed for many different damage factors that affect the composition and properties such as humidity, temperature, air pollution and microorganisms and other factors of the damage. The present study investigated the biodeterioration states of the surface of six colored glasses- which used in stained glass- (black dark purple, opaque white, dark green, black dark, yellow semitransparent and red oxide cuprite) by the fungus *Stemphylium botryosum* after incubation for 6 months. Scanning electron microscopy attached with energy dispersive spectrometry (ESM-EDAX) was used to investigate the growth of *S. botryosum* on the glass sample composition before and after infection. Also the chromatic alternation was measured according to CIELAB system. Results showed that *S. botryosum* has developed clear changes on all six colored glasses surface as an alternation in element oxides, and the formation of hyphal. The result of glass decay is a sharp decrease of the network composition (SiO_2) as well as increase in CO_2 . We have shown that *S. botryosum* can colonize various types of glasses where the chemical elements necessary to its development become available. Dark green and black dark purple were the most affected colored glasses by *S. botryosum* with SiO_2 was decreased from 64.13% to 10.41% and 62.97% to 30.02%, respectively. The results revealed that, samples treated with *S. botryosum* have been decreased the oxide Cu in the Dark green from 0.10% to 0.11% and Mn in black dark purple from 0.16% to 0.09. Therefore, *S. botryosum* was able to biodeteriorate the colored glasses with distinct compositions. (Regarding the biodeterioration degree, there were differences between all the colored glasses in terms of alternation in element oxides compositions