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## Natural polysaccharides from microalgae for the protection of cultural heritage

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Cultural heritage, whatever their composition and location (indoor or outdoor), are susceptible to deterioration triggered by several factors, such as thermo-hygrometric conditions, mechanical stress, electromagnetic radiation and biodeterioration. One of the main challenges in this sector is the promotion of innovative products for the restoration/protection of artistic value surfaces.

In this context, we propose the development of a new product based on polysaccharides, extracted from unicellular algae, compatible with ancient materials and not harmful to humans and the environment. In particular, the interesting qualities of algal polysaccharides have been recently described, for their significant antioxidant, antifungal, cosmeceutical and nutraceutical activities in the medical, agri-food and cosmetics fields, but still little is known in the cultural heritage sector. Hence, the goal of our research is to utilize the microalgal polysaccharidic extract to foster an innovative restoration and conservation of artistic work (paper, wooden and mortar artworks), promoting mechanical restoration, as well as hindrance the onset of biotic colonization. For these reasons, specific strains of microalgae (wild type and mutants) were selected and grown to induce a natural accumulation of carbohydrates. Furthermore, an extraction protocol of the polysaccharide mixture was optimized and its composition determined by FT-IR, NMR, elemental chemical analysis, as well as its antioxidant capacity. Moreover, antifungal and antibacterial capacities on organic and inorganic materials will be tested. The consolidating and regenerative properties of polysaccharides will be analysed over the time by MO, FTIR, SEM-EDS, imaging UV, UV-VIS-NIR, in comparison with conventional treatments.

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