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ANTIFUNGAL WALL COATING BASED ON $Ca(OH)_2$ MIXED WITH MgO AND TiO_2 NANOPARTICLES

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Slaked lime (mainly composed of calcium hydroxide) is a commonly used building material applied on wall surfaces. This lime layer can be subjected to bio-deterioration due to the colonisation of different micro-organisms, with fungi being the main one. In this work, TiO_2 and MgO nanoparticles with sizes of 60 nm and 40 nm, respectively, were prepared using a hydrothermal method. They were mixed with $Ca(OH)_2$ particles in different proportions to form a series of suspensions. Powder X-ray diffraction analysis showed that MgO nanoparticles existed in the cubic phase while TiO_2 nanoparticles belonged to the anatase phase. The antifungal activities of these suspensions were tested in two different methods against *Aspergillus niger*, isolated from deteriorated wall surfaces. First, a preliminary assay was conducted by incorporating the nanoparticles mixture in the Potato Dextrose Agar medium with a fungal inoculum. In the second method, the suspensions were coated on glass Petri dishes. Then an inoculum of *A. niger* was introduced to the surface of this coating. Fungal growth on the coatings was observed under a natural photoperiod cycle and relative humidity of 80%. The study revealed that the $Ca(OH)_2$-MgO, $Ca(OH)_2$-TiO_2 and $Ca(OH)_2$-MgO-TiO_2 systems inhibited the germination and mycelial growth of *A. niger*. In contrast, the pure $Ca(OH)_2$ system was readily colonised. However, pure MgO based coatings showed the highest antifungal activity, and pure TiO_2 based coatings showed the lowest. MgO-TiO_2 mixtures exhibited an intermediate performance that gradually increased with the percentage (w/w) of MgO added. These nanoparticles can be used in pure or mixed form with $Ca(OH)_2$ to prepare an antifungal coating.

Keywords: Antifungal coating, *Aspergillus niger,* $Ca(OH)_2$ particles, MgO nanoparticles, TiO_2 nanoparticles