

SYNTHESIS OF ANTIMICROBIAL ADDITIVES TO CONTROL FUNGAL GROWTH IN WATERBORNE COATINGS

Romina Arreche¹, Katerine Igal¹, Natalia Bellotti², Patricia Vázquez¹

¹CINDECA, Chemistry, Argentina. ²Centro de Investigación y Desarrollo en Tecnología de Pinturas (CIDEPINT), Chemistry, Argentina.

The immobilization of antimicrobial agents in multiple materials, obtained by sol-gel, has clearly received much attention. The aim of this work was to synthesize different silica and zirconia-solids by the sol-gel method with the inclusion of Ag in order to develop antimicrobial additives. The synthesized solids were characterized by x-ray diffraction (XRD), potentiometric titration, specific surface area (S_{BET}), Fourier transform infrared spectroscopy (FTIR), scanning electron microscopy (SEM), transmission electron microscopy (TEM) and, the antifungal activity of the additives was assessed by agar plate inhibition against *Chaetomium globosum* and *Alternaria alternata*. After the inclusion as additives into the waterborne paint formulation the bio-resistance to fungal growth was evaluated by accelerated four-week agar plate assay. Amorphous materials with different acidic and textural properties were obtained. Most of the tested solids showed antifungal activity at the highest concentration used, and the presence of Ag increased the percentage of inhibition. The results indicate that a smaller size of Ag nanoparticles and a homogeneous distribution within the oxides improve the inhibitory activity and, the inhibitory effect of the samples would be related first, to the presence of Ag and second, to the acidity of the synthesized additives. Also, the mixed oxides Ag-additives improved the antifungal activity compare with the pure Ag-oxides (silica or zirconia). In this sense, a synergic effect between silica, zirconia and silver would be a promising result that would reduce the amount of silver in these bioactive materials. This work was performed as a preliminary study, in order to guide the selection of a suitable additive a list of possible antifungal agents.

Keywords: silver, antimicrobial additives, waterborne coatings

Acknowledgment:

The authors wish to thank Mariela Theiller for providing the scanning electron microscopy images, Graciela Valle for FT-IR spectra and Pablo Fetsis for textural properties measures. This work was supported by National Scientific and Technical Research Council (CONICET), Comisión de Investigaciones Científicas de la Provincia de Buenos Aires (CICPBA) and National University of La Plata (UNLP).

Presenting author's email: arrecheromina@gmail.com