Anti-bacterial Effectiveness of Casted Films and Electrospun Mats Containing Magnesium Oxide Particles

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***Abstract*— Waterborne diseases such as bacterial infections accounts for 1.8 million deaths annually, Worldwide. Metal oxide particles such as MgO (magnesium oxide), ZnO (zinc oxide), and TiO2 (titanium dioxide) particles have been found to display bactericidal properties. Composites containing these anti-bacterial metal oxides show potential for food storage and filtration applications. It is necessary for these composites to maintain mechanical integrity, while providing large surface area for high exposure of the metal oxide to the surrounding environment. To obtain these desired properties, we considered a polymerization reaction of MgO and different solvent evaporation techniques to form MgO aerogels (solvent exchange) and xerogels (atmospheric evaporation). The MgO aerogels and xerogels processed in composites by means of film casting and electrospinning. Casted films and electrospun mats of polylactic acid containi! ng 0-25wt% of MgO particles (< 63 microns in size) were produced and examined. The mats were characterized by scanning electron microscope in order to observe the overall structure of the mat as well as to determine the pore sizes. A SimPlate Total Plate Count system was employed to determine the effectiveness of the films and mats against Staphylococcus aureus and E. Coli. Initial studies have shown that casted films containing 25wt% MgO are 92% more effective than cast films containing no MgO.**