

# Anti-bacterial effectiveness of casted films and electrospun mats containing magnesium oxide particles

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**Abstract—** Bacterial infections account for 40% of foodborne illness outbreaks in the US. Metal oxide particles such as MgO (magnesium oxide), ZnO (zinc oxide), and TiO<sub>2</sub> (titanium dioxide) particles have been found to display bactericidal properties. Composites containing these anti-bacterial metal oxides show potential for food storage and medical supply 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 and compared two processes for producing composites: film casting and electrospinning. Casted films and electrospun mats of polylactic acid containing 0-25wt% of MgO particles (< 63 microns in size) were produced and examined. A SimPlate Total Plate Count system was employed to determine the effectiveness of the films and mats against *Staphylococcus aureus*. Initial studies have shown that casted films containing 25wt% MgO are 92% more effective than cast films containing no MgO.