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ALUMINUM-DOPED ZINC OXIDE COATINGS ON POLYLACTIC ACID FILMS FOR ANTIMICROBIAL FOOD PACKAGINGD. VALERINI<sup>1,\*</sup>, L. TAMMARO<sup>1</sup>, F. DI BENEDETTO<sup>1</sup>, G. VIGLIOTTA<sup>2</sup>, L. CAPODIECI<sup>1</sup>, R. TERZI<sup>1</sup>, A. RIZZO<sup>1</sup>

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## ABSTRACT

POLYLACTIC ACID (PLA) IS SAFE FOR CONTACT WITH FOOD, FLEXIBLE AND HIGHLY TRANSPARENT TO VISIBLE LIGHT, SO IT IS WIDELY USED FOR FOOD PACKAGING APPLICATIONS. THE ADDITION OF PROPER SURFACE COATINGS CAN PROVIDE FURTHER ADVANTAGES, SUCH AS ANTIMICROBIAL ACTIVITY AND OPTIMIZED OPTICAL PROPERTIES. TO THIS AIM, NANOSTRUCTURED ALUMINUM-DOPED ZINC OXIDE (AZO) COATINGS WERE SPUTTER-DEPOSITED ONTO EXTRUDED PLA FILM TO FUNCTIONALIZE ITS SURFACE, USING DIFFERENT SPUTTERING POWER. MORPHOLOGICAL, STRUCTURAL AND OPTICAL CHARACTERIZATIONS WERE PERFORMED ON UNCOATED AND COATED FILMS, DEMONSTRATING UNIFORM COVERAGE OF THE PLA SUBSTRATE WITH POLYCRYSTALLINE AZO COATINGS AND HIGH VISIBLE TRANSPARENCY. SPECTROPHOTOMETRIC MEASUREMENTS CARRIED OUT ON PHYSIOLOGICAL SALINE SOLUTIONS CONTAINING THE SAMPLES REVEALED LOW RELEASE EFFECTS FROM THE UNIFORMLY-COATED FILMS. FINALLY, THE SPUTTER-COATED SAMPLES EXHIBITED STRONG ANTI-BACTERIAL ACTIVITY AGAINST *ESCHERICHIA COLI*. THE RESULTS OF THIS PRELIMINARY STUDY INDICATE THAT AZO-COATED PLA FILMS ARE PROMISING MATERIALS FOR ENVIRONMENT-FRIENDLY ACTIVE PACKAGING APPLICATIONS.

**KEYWORDS:** ANTI-BACTERIAL COATING; FILM EXTRUSION; FOOD PACKAGING; NANOSTRUCTURED ALUMINUM-DOPED ZINC OXIDE; POLYLACTIC ACID (PLA); SPUTTERING.

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