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MECHANICAL, BARRIER, ANTIMICROBIAL AND THERMAL PROPERTIES OF ACTIVE NANOCOMPOSITES AS FOOD PACKAGING MATERIALS

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The objective was to explore production and characterization of active nanomaterials for food packaging. In particular, polypropylene (PP) film (control), PP film with addition of 1 wt% nanoclay, active PP film with addition of 5 wt% poly-β-pinene (PβP) and active-nano-PP film including 1 wt% nanoclay plus 5 wt% PβP were prepared. Mechanical, barrier (oxygen transmission rate (OTR) and water vapor transmission rate (WVTR)), antimicrobial properties and thermal stability of the films were examined. Addition of nanoclay and nanoclay/PβP increased tensile mechanical properties of PP which is important for the potential use as a food packaging material. While the addition of 1 wt% nanoclay reduced OTR and WVTR by 10% and 24% comparing to neat PP, addition of 1 wt% nanoclay plus 5 wt% PβP reduced OTR and WVTR by 24% and 31%, respectively. The WVTRs of PP, PP-nanoclay, PP-nanoclay-PβP were 1.88, 1.43 and 1.30 g/(m^2×day), respectively. Nanomaterial containing PβP reduced the test microorganisms (*E. coli*) 1.33 log CFU/ml (or 24.3% reduction) comparing to the control, PP/nanoclay film. The addition of nanoclay or PβP enhanced the thermal stability of PP. The TGA curves of PP/PβP, PP/nanoclay and PP/nanoclay/PβP composites are shifted toward higher temperatures, as compared with neat PP. The nanomaterials were tested for sliced salami using vacuum and modified atmosphere packaging technologies. The antibacterial effect of PβP containing nanomaterial was pronounced under vacuum and no bacterial growth was observed for 75 days.

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