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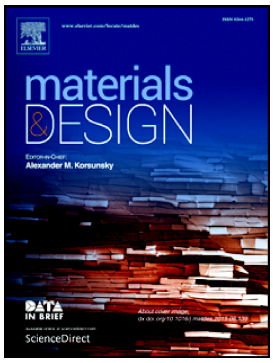

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A new biodegradable composite with open cell by combining modified starch and plant fibers

Chuan-wei Zhang, Fang-yi Li*, Jian-feng Li, Li-ming Wang, Qi Xie, Jie Xu, Shuai Chen

Key Laboratory of High Efficiency and Clean Mechanical Manufacture (Ministry of Education) Shandong University, Jinan 250061, China

Abstract

Biodegradable composites with open cell structure were prepared through thermo-cavity foam molding using plant fibers and modified starch as main raw materials, and other additives as active agents. Oxidized starch (OS), thermoplastic starch (TPS), and thermoplastic oxidized starch (TPOS) were utilized to increase compatibility between starch and plant fibers and to improve mechanical properties of composites. Prepared composites were evaluated using tensile, compressive, and static compression tests. Results showed that TPOS improved the tensile strength by 69% in comparison with native starch (NS)-based composites. Considerable improvement was not observed in tensile strengths of OS-based and TPS-based composites. Following crystalline, hydrogen bond, and micro-structure of modified starch were researched to gain comprehensive view on mechanism of mechanical property changes in composites with NS, OS, TPS and TPOS. Fourier transform infrared analysis showed that new hydrogen bonds were formed between the plasticizer, oxidizer, and starch. X-ray diffraction