

Effect of adding Polysilane on Heat Fusion Properties of PP.

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In this study, the effect of adding polysilanes ($M_w = 500$, PMPS) of polypropylene (PP) on the heat-fusion properties was investigated. The peeling energy of the PP films with PMPS could be detected clearly for 60 sec and it increased with time, and then the films were heat-fused completely (not peelable) for 120 sec. On the other hand, the peeling energy of the pristine PP films heat-treated for 60 sec was much smaller than that of PP with PMPS, and it also increased with time but they could not be heat-fused completely within 120 sec, and it took more than 300 sec to have the pristine PP films heat-fused completely at the same conditions. From FE-TEM results, the discontinuous boundary of the neat PP films was observed even when they were apparently heat-fused completely. As for the PP films added PMPS on the surface of them, however, the boundary at the heat-fused surface of PP films was hardly observed, and continuous lamella crystals can be observed. When comparing the neat PP and PP/PMPS blend sample, the lamellar size of the neat PP sample was relatively larger than that of PP/PMPS blend. Moreover, from the line profile of STEMHAADF observation, it was found that PMPS existed at the amorphous regions homogeneously in PP matrix and no phase separation or segregation of PMPS could be observed at all. On the basis of MD calculation, it was found that PE/Polysilane 3 corresponding to PE/Monosilane 12 had the largest negative value (-470 kcal/mol) of all the system. Consequently, it was deduced that there was some interaction between polyolefin (PE) and polysilane (PMPS) molecules, and there was an optimum conditions of PMPS content in polyolefin materials.

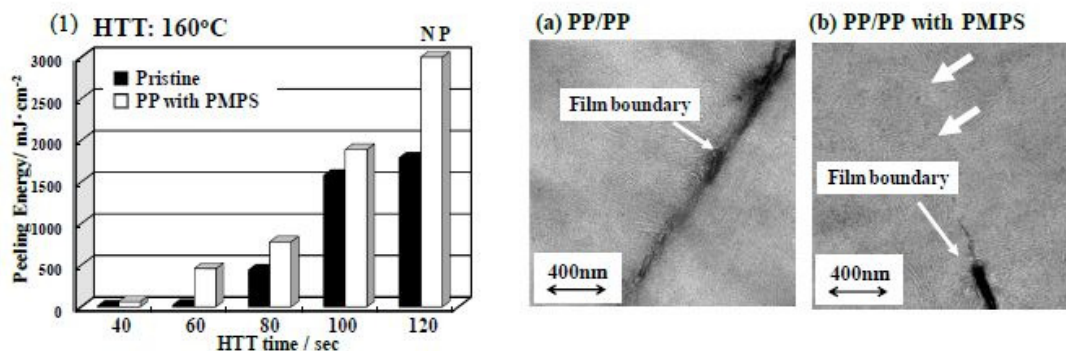


FIGURE (1) Peeling Energy of Pristine PP (black bar) and PP with PMPS (white bar) and, FE-TEM results for heat-fused PP/PP films at 160°C for 300 sec: (a) neat PP and (b) with PMPS (1.0 mg/cm²).

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