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Non-isothermal crystallization kinetics of polypropylene containing silica hybrid particles as fillers

ZHENG Jingzhi^{1,2}, ZHOU Xingping², XIE Xiaolin²

- 1. Key Laboratory for Green Chemical Process of Ministry of Education, School of Chemical Engineering and Pharmacy, Wuhan Institute of Technology, Wuhan 430073, China;
- 2. State Key Laboratory of Material Processing and Die & Mould Technology, School of Chemistry and Chemical Engineering, Huazhong University of Science and Technology, Wuhan 430074, China

Abstract: By means of in situ emulsion copolymerization, core-shell silica hybrid particles with poly(MMA-co-BA) shells were fabricated, which were subsequently compounded with isotactic polypropylene (PP) in the molten state to prepare SiO₂/PP composites. The non-isothermal crystallization kinetics of SiO₂/PP composites was investigated by DSC. The results show that the addition of silica hybrid particles has an obvious nucleating effect on the crystallization of PP, increasing crystallization temperature and crystallization rate. On the contrary, the activation energies of SiO₂/PP are higher than that of the pure PP. The kinetics of non-isothermal crystallization of SiO₂/PP can be indicated by Mo equation. It shows that silica hybrid particles decrease the cooling rates of PP needed to reach relative crystallinities in a unite time.

Keywords: in situ emulsion copolymerization silica-polymer hybrid particles SiO₂/polypropylene composites DSC non-isothermal crystallization kinetics

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E-mail: xpzhou@mail.hust.edu.cn

Email: xpzhou@mail.hust.edu.cn

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