以 DCPA 为交联剂的 P(BA-EHA)/PVC 复合胶乳的表征及共混改性 PVC 研究

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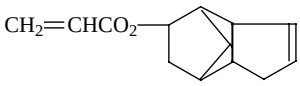
关键词　丙烯酸双环戊烯基酯　核壳聚丙烯酸酯/PVC 复合粒子　聚氯乙烯改性

丙烯酸双环戊烯基酯（DCPA）具有如下结构：



DCPA 分子中具有两个不同活性的丙烯酸酯双键和双环戊烯基双键，存在易发生自由基蜕化链转移的烯丙基氢[1]。正是由于 DCPA 结构上的特点，特别是较大的空间位阻，将其用作聚丙烯酸酯类弹性体的交联剂，考察它在弹性体表面接枝氯乙烯和共混改性 PVC 材料性能中的影响很有意义。

结果与讨论

图 1 是 DCPA 为交联剂的 P(BA-EHA)/PVC 复合胶乳透射电镜照片（TEM）。可以看出复合粒子具有明显的核壳结构，粒子粒径分布均匀。并且粒子间可能由于活性较低的环戊烯双键的接枝作用产生了明显的交联连接现象。

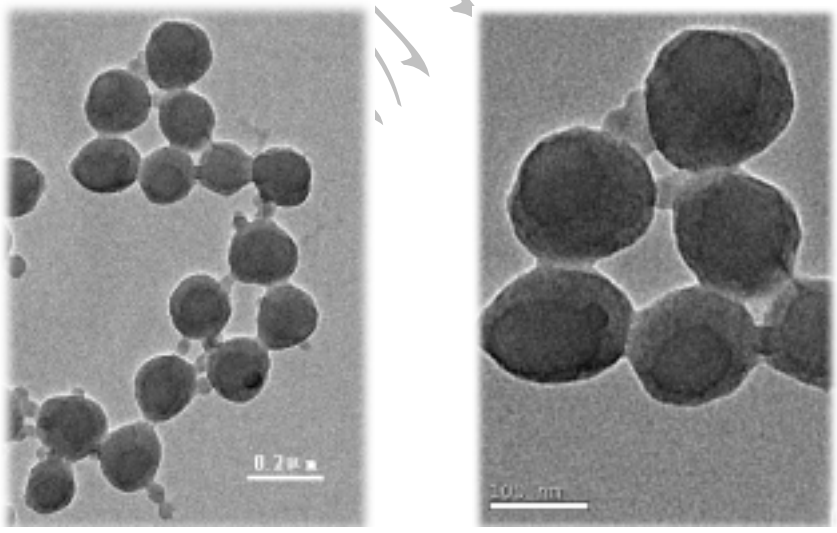


Fig.1 TEM photos of the P(BA-EHA)/PVC with a crosslinking agent DCPA (core-shell ratio: 50:50 DCPA 8%)

图 2 为交联剂 DCPA8%时 P(BA-EHA)胶乳接枝氯乙烯前后粒径分布图（核壳比为 50/50）。接枝后（91.0nm）复合粒子平均粒径增大，较接枝前（81.8nm）增

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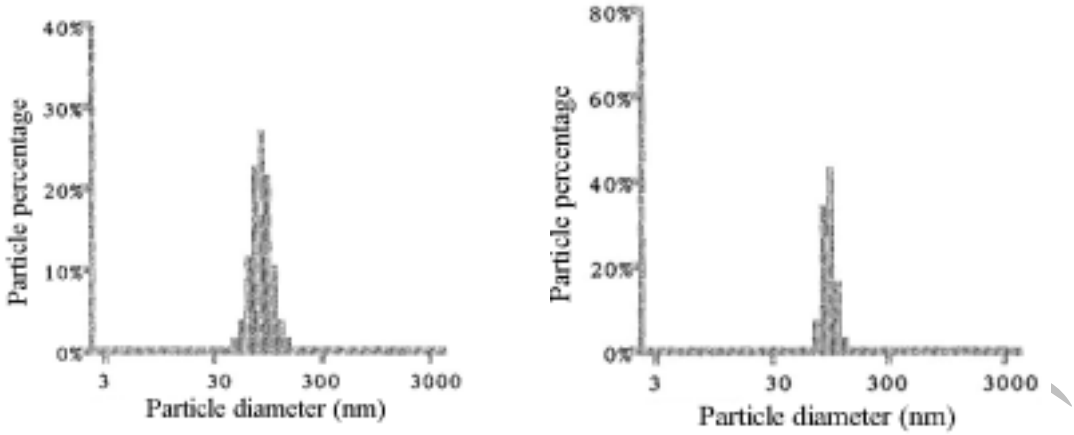
加了 9.2 nm。这说明接枝聚合确实发生在了 P(BA-EHA)胶乳粒子的表面，实现了 PVC 的壳层包覆。这与我们最初关于粒子结构的设计是一致的。



（a）接枝前　(core-shell ratio: 50:50 DCPA 8%)　（b）接枝后

Fig.2 Particle diameter distribution of the P(BA-EHA)/PVC latices

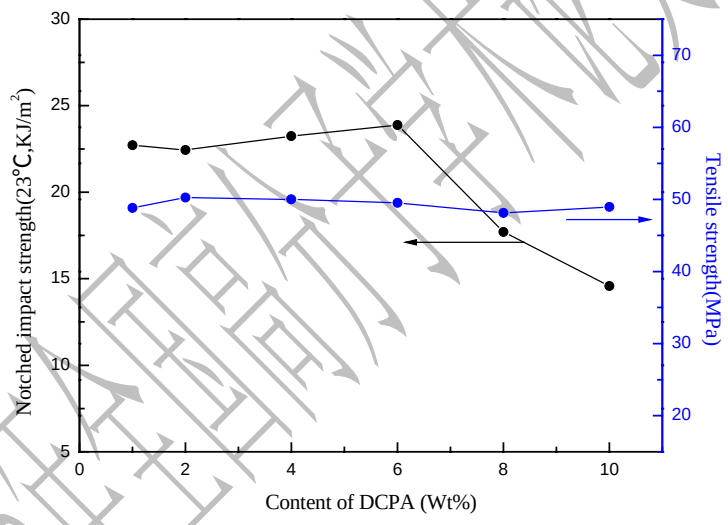


Fig.3 Influence of DCPA content on impact strength and tensile strength of materials

图 3 是以 DCPA 为交联剂的 P(BA-EHA)/PVC 复合粒子对共混改性 PVC 力学性能的影响关系。当 DCPA 含量为 6%时，冲击强度达到最大值（23.88 KJ/m²），相对于纯 PVC 的冲击强度（6.47 KJ/m²）提高了 2.7 倍。比较其它交联剂，其改性效果较优[2, 3]，这是由 DCPA 特殊结构所决定的。DCPA 中含有双环戊二烯基，其空间位阻大，分子间作用力强。当 DCPA 加入量适当时，由于双环戊烯基双键和烯丙基氢的交联与接枝作用，因而能显著提高材料的冲击性能。当 DCPA 含量继续增大，核层橡胶相由于交联密度过高，DCPA 空间效应造成了交联接枝共聚物刚性过大，使其向致密的刚性粒子方向转变，引起橡胶弹性体的增韧能力下降。

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Blending Modification of Polyvinyl Chloride by Polyacrylate crosslinked with DCPA grafted vinyl Chloride Composites

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Abstract
A kind of crosslinked polyacrylate latices with relatively narrow distribution of particle diameters which is abbreviated to P(BA-EHA) was synthesized by seeded emulsion copolymerization. Butyl acrylate, 2-ethylhexyl acrylate and dicyclic pentenyl acrylate(DCPA) were used as comonomers of the polyacrylate and cross-linking agent, respectively. In the presence of the P(BA-EHA) latices,P(BA-EHA)/PVC were prepared by grafting vinyl chloride copolymerization in an autoclave.

The influence of an adding amount of the crosslinking agent on the mechanical properties of PVC blends was investigated in detail. Particle diameter distribution and morphology of the composite latex were characterized with the aid of dynamic laser scattering and TEM. The effects of the amount of DCPA with a special molecular structure were researched on the properties of the materials.

Keywords: Dicyclic pentenylacrylate (DCPA),Core-shell polyacrylate/ polyvinyl chloride,polyvinyl chloride modification