

论文

等离子体引发接枝聚合丙烯酸腈对聚乙烯表面改性的研究

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摘要:

研究了等离子体引发单体接枝聚合对聚合物的表面改性.选取PE为聚合物底材接枝丙烯酸腈,研究了接枝反应条件对接枝率的影响规律.反应温度愈高,接枝率愈大,当反应温度达到溶液的沸点时,接枝率急剧增大;随着单体浓度的增大,接枝率几乎呈现出线性增长的趋势;接枝率随反应时间的延长而增大.溶剂对接枝反应有较大的影响,当选用(甲醇+水)作为混合溶剂时,接枝率随着水与醇的体积比 $R(R=V(H_2O) / V(C_nH_{2n+1}OH))$ 的增加而增加.当选用(乙醇+水)或(异丙醇+水)作为混合溶剂时,水醇体积比R为零(即溶剂为纯乙醇或异丙醇时)接枝率最大,当溶剂中有水参与时,接枝率下降.并利用ATR FTIR分析证明了丙烯酸腈单体接枝到聚合物薄膜样品表面.

关键词: 等离子体;表面改性;接枝;聚合;聚乙烯;丙烯酸腈

The investigation of polyethylene surface modification by cold plasma induced grafting polymerization of acrylonitrile

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Abstract:

The surface modification of the polymer was studied by the plasma induced polymerization method. The influence of the grafting reaction condition to the grafting ratio was investigated by using polyethylene as a polymer substrate and the acrylonitrile as a grafting monomer. The higher the reaction perature, the higher the grafting ratio. The grafting ratio sharply increased when the reaction temperature reached the boiling temperature of the reaction solution. The grafting ratio proportionedly increased with the monomer concentration. The grafting ratio increased along with the prolonging of the reaction time. The solvent had great influence on the grafting reaction. The grafting ratio increased with the increasing of volume ratio $R(R=V(H_2O) / V(C_nH_{2n+1}OH))$ when using methanol and water as mixed solvent. When R was zero, which means using only ethanol or isopropanol as the solvent, the grafting ratio had the maximum values for polyethylene grafting with acrylonitrile. The grafting ratio decreased when the solvent contained water. It was confirmed by ATR FTIR analysis that acrylonitrile was grafted onto the polymer surface.

Keywords: plasma; surface modification; grafting; polymerization; polyethylene; acrylonitrile

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