ジエチル(1, 10−フェナントロリン−N_1, N_{10})亜鉛(Ⅱ)錯体を開始剤に用いた親水性または疎水性高分子の表面改質

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Surface modification of hydrophilic or hydrophobic polymers by graft polymerization using diethyl(1,10-phenanthroline-N_1,N_{10})zinc(Ⅱ) complex as an initiator

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<Introduction>

Diethylzinc (DEZ) is used in the manufacture of semiconductor devices and zinc oxide films, and is also used as an alkylating agent and polymerization catalyst. In addition, research on radical polymerization of vinyl monomers are under consideration using the property of DEZ, which readily generate radical species at ambient temperature when reacted with oxygen. However, since DEZ is a pyrophoric compound that is extremely unstable in air and water, this study used a diethyl(1,10-phenanthroline-N_1,N_{10})zinc(II) complex that is relatively stable in air and water.

Surface modification is being studied to enhance the functionality of hydrophobic and hydrophilic polymers such as polyolefin and cellulose, which are widely used. The purpose of this study is to modify the surface of these polymers with diethylzinc complex.

<Experiments>

Methyl methacrylate (MMA) and 1H,1H,2H,2H-tridecafluoro-n-octylacrylate (TDFOA) were used as graft monomers. MMA onto ethylene/tetrafluoroethylene copolymer (ETFE), also TDFOA onto cellulose nanofibers (CNFs) was graft polymerized in a solution system or bulk system using diethyl zinc complex and oxygen. After the graft polymerization, free homopolymers were removed by soxhlet extraction. The polymer grafted on these polymer surfaces were confirmed by FT-IR.

<Results>

MMA could be grafted onto ETFE films using diethylzinc complex with oxygen. The surface morphology of grafted ETFE was confirmed from the contact angle measurement of water that the hydrophilicity was improved (94.6° to 65.5°). Moreover, the graft polymerization of TDFOA onto CNFs was carried out. The hydrophobicity was improved by measuring contact angle (18.8° to 114.3°).

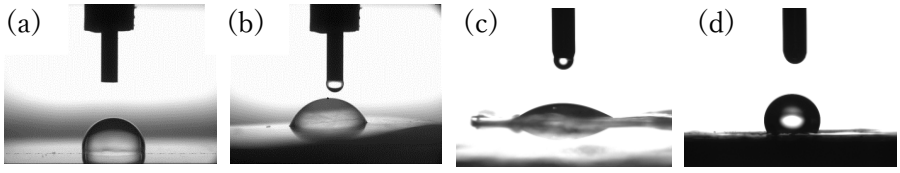

Figure. Contact angles on the (a) ETFE (94.6°), (b) ETFE-g-PMMA (65.5°), (c) CNFs (18.8°) and (d) CNFs-g-PTDFOA (114.3°)

<Reference>

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