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Crystals orientation of polybutylene adipate/polyvinyl chloride blend under uniaxial drawing

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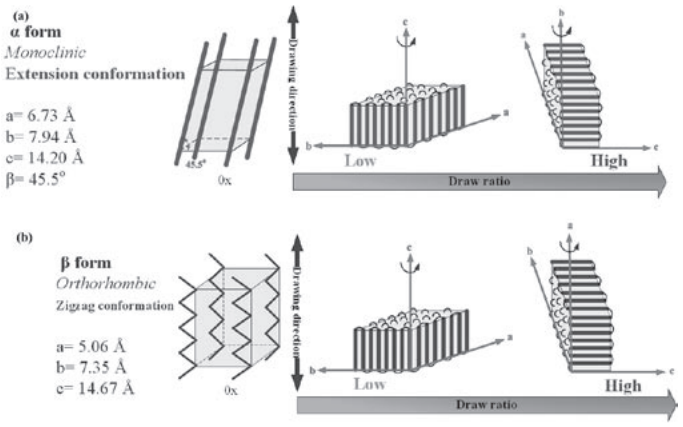
The thin films of miscible Polybutylene adipate)/Polyvinyl chloride (PBA/PVC) 6/4 blend under uniaxial drawing behavior was studied by wide angle X-ray diffraction (WAXD), small angle X-ray scattering (SAXS) and grazing incidence wide angle X-ray scattering (GIWAXS). We study crystals orientation of polymorphic PBA crystals through different draw ratios. The polymorphic phase transition of PBA only depends on temperature and it does not change under strain. The c-axis parallels to the stretching direction at low drawing ratios on both PBA crystals of alpha- and beta- crystals. In contrast, the b-axis of the PBA alpha-crystal was oriented parallel to the stretching direction and the a-axis of the PBA beta-crystal was oriented parallel to the stretching direction at high drawing ratios. Figure 1 Models of PBA/PVC blend under drawing crystallization: (a) PBA alpha-crystal and (b) PBA beta-crystal .



Keywords: thin film of polymer, crystals orientation, crystallization under tenstion

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Crystallographic structure of $LiCoO_2$ based ruthenium catalyst for sodium borohydride hydrolysis

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As an energy carrier, hydrogen is a very clean fuel without greenhouse gases, ozone layer depleting chemicals, acid rain ingredients and pollution. Sodium borohydride ($NaBH_4$) can be used as a hydrogen storage medium due to high hydrogen storage capacity (10.8%wt). $NaBH_4$ in aqueous alkaline solution generates hydrogen and sodium borate ($NaBO_2$) as by product contact with catalyst according to the hydrolysis reaction which is known to run via zero order kinetics. In the present study, Ru- $LiCoO_2$ catalyst has been manufactured to generate clean hydrogen from $NaBH_4$. Nano-sized ruthenium (Ru) dispersed on the $LiCoO_2$ surface by wash coating process to prepare the catalysis for $NaBH_4$ hydrolysis. The catalyst is characterized by scanning electron microscopy including EDX analysis (SEM-EDX), X-ray diffractometry (XRD). EDX analysis show the ~15wt. % Ru containing by the $LiCoO_2$, XRD patterns shows the Ru- $LiCoO_2$ catalyst display the characteristic peak of the $LiCoO_2$ structure. The analysis show Ruthenium particles coated the $LiCoO_2$ ceramics. A new study about the coating thickness has also been studied and the thickness of the Ruthenium coated on the surface of $LiCoO_2$ is measured.

Keywords: catalyst, ruthenium, lithium cobalt oxide

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Structural disorder in the $Ce_{0.5}Zr_{0.5}O_2$ catalyst: A possible factor of the high catalytic activity

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Ceria-zirconia $Ce_{0.5}Zr_{0.5}O_2$ catalysts are widely used in the cleaning of exhaust gases from automobiles. The oxygen storage/release capacity is one of the most important factors to affect catalytic activity of $Ce_{0.5}Zr_{0.5}O_2$. Bulk oxygen diffusion is one of the steps of the oxygen storage/release process in $Ce_{0.5}Zr_{0.5}O_2$. The development of improved catalysts requires a better understanding of crystal structure and bulk oxygen ionic diffusion in ceria-zirconia materials. The $Ce_{0.5}Zr_{0.5}O_2$ solid solutions have been investigated by some researchers [1]. However, structural disorder and diffusion path of oxygen ions in $Ce_{0.5}Zr_{0.5}O_2$ remain poorly understood. Here we report the structural disorder and diffusion path of oxygen ions in $Ce_{0.5}Zr_{0.5}O_2$ [2, 3]. Nuclear-density distribution of cubic $Ce_{0.5}Zr_{0.5}O_2$ compound has been studied at 1831 K by the maximum-entropy method (MEM) and MEM-based pattern fitting combined with the Rietveld method using in situ neutron powder diffraction data. The oxygen ions show a large positional disorder and shift to the <111> directions. Possible bulk diffusion paths of the oxygen ions can be seen along the <100> and <110> directions. The spatial distribution of oxygen ions in $Ce_{0.5}Zr_{0.5}O_2$ is greater than that of CeO_2, which is consistent with the higher bulk diffusivity of oxygen ions in $Ce_{0.5}Zr_{0.5}O_2$. It is suggested that the greater disorder of $Ce_{0.5}Zr_{0.5}O_2$ is a factor of its higher catalytic activity.

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