Viscoelasticity of SEBS/Oil System under Carbon Dioxide Atmosphere and Its Foaming Behavior

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1 . Introduction

In physical foaming using carbon dioxide as a foaming agent, one of the factors which determines the cellular structure of a foamed object is the flow characteristic at the time of CO_2 dissolution. We studied the relation between the viscoelasticity behavior for styrene-*b*-(ethylene-co-butylene)-*b*-styrene(SEBS) when dissolving at the time of the carbon dioxide dissolution, and the produced foaming behavior.

2 . Results & Discussion

We used commercial SEBS as a sample. Styrene content is 31wt% and molecular weight is 8.1×10^4 g/mol. And paraffinic oil which is a selective good solvent to PEB phase was used as an additive.

Fig.1 shows SEM image of SEBS/oil 25, 50 wt% foamed at 75°C and 10MPa of CO_2. There was a big difference in the bubble diameter between SEBS/oil25 and 50 wt% at 75 °C.

Fig.2 shows G' of SEBS/oil 25, 50 wt% at 75°C under ambient air or CO_2(10MPa). Although a big difference was not seen in G' under atmosphere pressure, when carbon dioxide was dissolved, the substantial change was seen in G' of SEBS/oil 50 wt%. Even if carbon dioxide was dissolved in SEBS/oil25wt%, G' still showed frequency independent curve. For SEBS/oil50wt%, however, G' significantly reduced and frequency dependent curve. We consider that the difference of G' behavior SEBS/oil25wt% and 50wt% under CO_2 atmosphere is caused by the difference of the amount of carbon dioxide dissolutions.

It is suggested that the difference of G' influenced the control of the bubble growth, and the bubble diameter was greatly changed. In our presentation, we explain more detail of relationship between viscoelasticity and foaming structure.

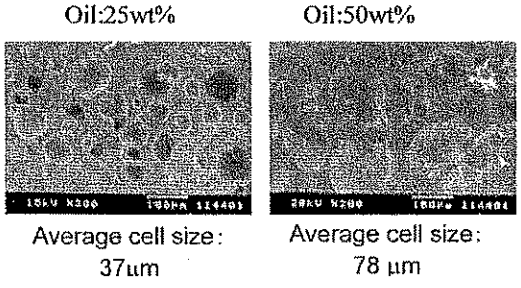

Fig.1 SEM image of SEBS/oil 25,50 wt% foamed at 75°C and 10MPa.

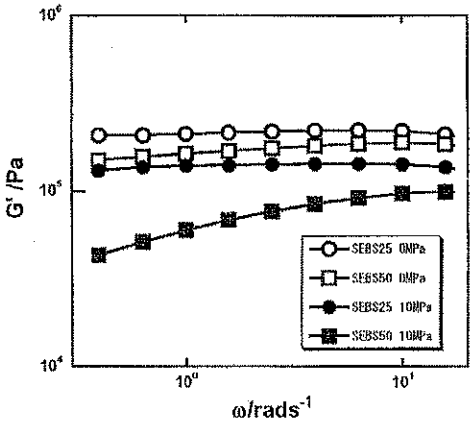

Fig.2 Storage modulus of SEBS/oil25 and 50wt% at 75 °C