Title	Estimation of optical transmittance of polymer materials using spherulites growth model
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Purpose of this study	We estimate light transmittance of polyethylene using computer simulations based on spherulites growth.
System (Material)	Polyethylene
Program (including analysis)	Optical transmittance simulator ("TURBAN in MUFFIN")
Method & Some important input parameters	(Method) TURBAN consists of two parts: (i) Computer simulation of spherulite growth on Avrami conditions, and (ii) Computer simulation of the optical transmittance based on Maxwell equation using the obtained spherulite structures. (Inputs) -Nucleation density or nucleation rate. -Spherulite growth rate. -Spatial scale. -Crystallinity. -Refractive indices of each crystal axis direction and amorphous parts.
Advance & Problem	(Advance) We can estimate a light transmittance of polymeric materials with spherulite system by computer simulation. (Problem) Input and output interface of the simulator TURBAN is not in UDF file format.
References	[Manuscript]　　Submitted/Accepted(　/　) [Presentation at conferences (Meetings)] 50th SPSJ Annual meeting (at Osaka 2001,May) 50th SPSJ Conference (at Tokyo 2001,Sept.)
KeyWords (in English)	polyethylene, transmittance, spherulite, films, simulation, turbidity

Results (Remarks)

We carry out computer simulations of spherulites growth on Avrami conditions. Fig.1 shows the images of simulation of 3D spherulite growth with inhomogeneous nucleation. Using the obtained spherulites structures, we estimate a turbidity of the polyethylene materials. Fig.2 shows the turbidity spectra against light wavelength for various spherulite average diameters. The result of the simulation is in good agreement with an experimental result of polyethylene haze(Fig.3).
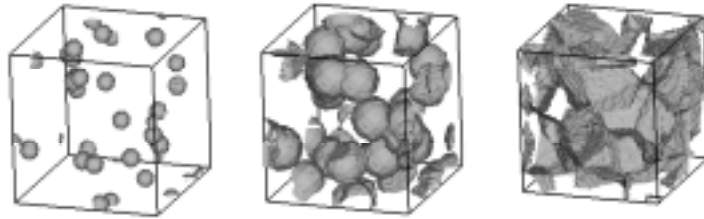

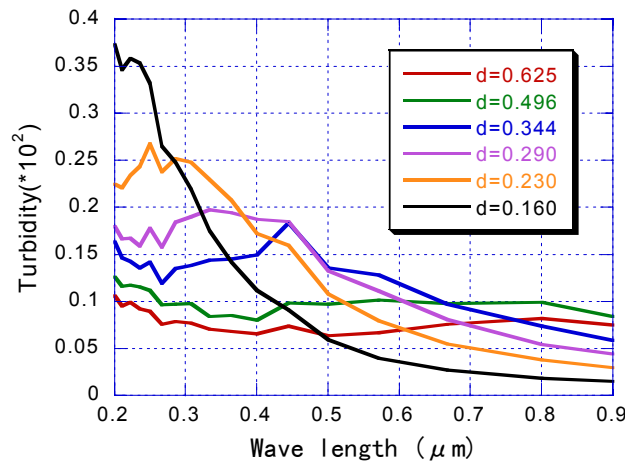
Fig.1 Simulation images of spherulites growth.

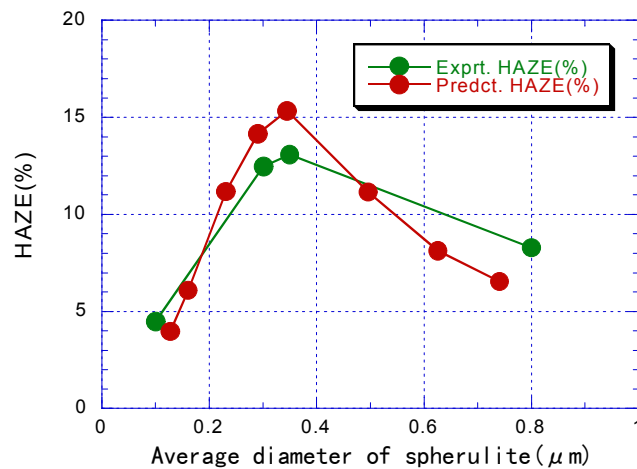Fig.2 Turbidity spectra from the simulation with various spherulite average diameters.

Fig.3 Predicted HAZE and experimental[1] HAZE.

[1] Lei Wang, M. R. Kamal and A. D. Rey, *Polym. Eng. Sci.*, **41**, 358 (2001).