

論文要旨
Thesis Abstract

(yyyy/mm/dd) 2024 年 06 月 18 日

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主論文題名 (Title) Controlled Crazing in Polyethylene using Focused Electron Beams			
内容の要旨 (Abstract) This study investigates the complex interplay between focused electron beam (FEB) irradiation and tensile strain on polyethylene (PE), primarily focusing on understanding their combined effects on craze formation, microstructure evolution, and arrest crack propagation. Drawing upon insights from an extensive literature review, this research extends this theoretical foundation by employing a comprehensive approach that combines Monte Carlo simulations, Raman spectroscopy, and observational analysis post-tensile strain to thoroughly explore the influence of FEB irradiation on both the microstructure and mechanical properties of PE. Specifically, the investigation delves into how FEB irradiation affects the localization, morphology, and size of craze formation, the impact on the evolution of PE microstructure, and the potential to arrest crack propagation under tensile deformation. These findings reveal that FEB irradiation induces controlled craze formation and structural modifications within PE, resulting in notable enhancements in mechanical strength and resistance to crack propagation. Through meticulous examination of craze formation and crack behavior, this research makes a significant contribution to the field of materials science, offering the development of more special applications on polymer materials.			