

Abstract Submitted  
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**Nanoscale phase transitions within single ion tracks.** WILLIAM WEBER, University of Tennessee, RAM DEVANATHAN, Pacific Northwest National Laboratory, PEDRO MOREIRA, Universidade Estadual de Campinas — The dynamics of track development due to the passage of energetic ions through solids is a long-standing issue relevant to nuclear materials, age-dating of minerals, space exploration, and nanoscale fabrication of novel devices. We have integrated computer simulation and experimental approaches to investigate nanoscale phase transitions under the extreme conditions created within single tracks of energetic ions in the  $\text{Gd}_2\text{Zr}_{2-x}\text{Ti}_x\text{O}_7$  system and  $\text{ZrSiO}_4$ . Based on the inelastic thermal spike model, we have used molecular dynamics simulations to follow the time evolution of the structure of individual tracks and to reveal the phase transition pathways to experimentally observed concentric track structures. The molecular dynamics simulations clearly demonstrate the dependence of track evolution on composition, deposited energy density, and the complex competition among melting, disordering and recrystallization processes.

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