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Title: Multiscale Modeling Framework in Simulating Radiation Damage

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Radiation damage phenomena involve good examples of the well-worked phrase ?multiscale.? The primary damage event, an atomic displacement cascade, takes place on the pico-second time scale with a length scale of a few to a few tens of nanometer. This is followed by a range of diffusive and kinetic phenomena on the scale of microns and seconds, ultimately leading to macroscopic dimensional and mechanical property changes. In order to reliably predict the effects of displacive irradiation, it is necessary to work at each time and length scale. The currently used approaches, ranging from ab intio to atomistic to mesoscale, will be discussed and the relevant phenomena described. In particular, the issue of how critical information obtained at the lowest length scales is propagated to the longer length will be discussed. This include examples of how ab initio results can be critical in understanding mesoscale microstructeral observations.