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Dynamic Formation of $NiSi_2$ in Porous Amorphous Si Nanorods Observed by In Situ TEM JIANGUO FAN, University of Georgia — We investigated the dynamic formation of $NiSi_2$ nanocrystals in a porous amorphous silicon nanorod with in situ heating TEM. The nanorod was prepared by sequential electron beam depositions of Si, Ni, and Si at an oblique angle. Due to the nature of atomic shadowing and limited diffusion at low deposition temeperature, the structure was porous and amorphous. Ni diffusion started at 300 °C and oxides in the porous structure greatly surpressed the formation of early silicide phases such as NiSi, Ni_3Si_2, and $Ni_{31}Si_{12}$. At 400-500 °C, $NiSi_2$ crystallites formed along the nanorod and were defined by the porous template. These structural evolutions were identified and confirmed by electron diffraction, X-ray analysis, and high-resolution TEM. The formation mechanism and possible applications will be discussed.

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