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Increased interference fringe visibility from the post fabrication heat treatment of a perfect crystal silicon neutron interferometer¹ MICHAEL HUBER, NIST, B HEACOCK, A YOUNG, NCState, M ARIF, NIST, D G CORY, D A PUSHIN, U. Waterloo, R HAUN, Tulane U., I TAMINIAU, D SARENAC, J NSOFINI, U. Waterloo, M E JAMER, T GNAEUPEL-HEROLD, NIST — We find that annealing a previously chemically etched perfect silicon neutron interferometer at 800 °C dramatically increased interference fringe visibility from 23 % to 90 %. The Bragg plane misalignments were also measured before and after annealing using neutron rocking curves, showing that Bragg plane alignment was improved across the interferometer after annealing. This suggests that current interferometers with low fringe visibility may be salvageable and that annealing may become an important step in the fabrication process of future neutron interferometers and other neutron crystal optic elements. This work could lead to decreased need for chemical etching and larger, more exotic neutron interferometer geometries for use in quantum information processes, precision scattering length measurements, and other fundamental physics applications.

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