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Positron beam spectroscopy of defect kinetics in highly oriented pyrolytic graphite[1] VARGHESE ANTO CHIRAYATH[2], AMARENDRA G, IGCAR, Kalpakkam, India - 603102 — We report here slow positron beam spectroscopy of thermally activated defect annealing mechanisms in highly oriented pyrolytic graphite (HOPG) which has been implanted with 200 keV carbon ions. The HOPG samples were irradiated to a dose of 10^{14} and 10^{15} ions/cm^2 which are just below the dose required for amorphization. The open volume defect-sensitive positron studies have clearly shown a defect annealing mechanism at temperatures close to the Wigner energy release peak for both the lower and higher dose irradiated samples. The sample irradiated to higher dose has also shown a second defect annealing step at 723K from near the end of range of the implanted ions. This step however was not visible in the lower dose sample and has not been previously reported. Positron beam spectroscopy could also detect the presence of interstitial defects trapped at the inter-planar regions after the open volume defect recovery by 973 K. These results will be compared to the present understanding of the open volume defect structures and their migration in graphite as well as in other sp^2 hybridized nanostructures like graphene.

[1]Research fellowship from Department of Atomic Energy, India
[2]presently at Univ of Texas, Arlington

Varghese Anto Chirayath
Univ of Texas, Arlington

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