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Fabrication and simulation of Novel Ultra Thin 3D Silicon Detector - Plasma Diagnostics

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A novel ultra thin silicon detector called U3DTHIN has been designed and built for applications that range from neutral particle analyzers (NPA) used in Corpuscular Diagnostics of High Temperature Plasma to very low X-Ray spectroscopy. The main purpose of this detector is to provide a state-of-the-art solution for the upgrade of the current detector system of the NPAs at JET and also to pave the road for the future detection systems of the ITER experimental reactor. Currently the NPAs are using very thin scintillator - photomultiplier tube, and their main drawbacks are poor energy resolution, intrinsic scintillator nonlinearity, and relative low count rate capability and finally poor signal-to-background discrimination for the low energy channels. The proposed new U3DTHIN detector is based on very thin sensitive substrate which will provide nearly 100% detection efficiency for ions and at the same time very low sensitivity for the neutron and gamma background

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