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An investigation of tritium passivated silicon as a source for beta-decay experiments ADAM LIBSON, MELISSA JERKINS, MARK RAIZEN, The University of Texas at Austin — Passivating single crystal silicon surfaces with hydrogen is a well established technique. In the example of Si(111)(HxH) the hydrogen terminates the dangling silicon bond, and the resulting surface is very inert. We propose to replace the hydrogen atoms with tritium, which would result in a tritium passivated silicon surface Si(111)(TxT). This surface would be similarly inert and would give a tritium density on the surface of 1.5e15 atoms/cm^2. This tritium density suggests that Si(111)(TxT) may be useful as a source for tritium beta decay experiments attempting to measure the neutrino mass. One advantage of a Si(111)(TxT) source is that it would eliminate scattering of the beta. In addition this source is simple to construct and maintain for the life of an experiment, as it does not require any cryogenics and only modest quantities of tritium. Before this source could be used, the molecular final state corrections from the tritium bond with the silicon surface would need to be calculated. An experiment is under way to demonstrate that in-situ cleaning and re-passivating of the Si(111)(TxT) surface is feasible.

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