

Surface effect on ultracold muonium emission from n-Si

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Search of new material to produce the low thermal energy muonium (ultracold Mu, UCMu hereafter) is essentially important to generate intense and coherent slow muon beam for ultraslow muon microscope, transmission muon microscope, muon g-2/EDM experiment, and exploring fundamental surface science to understand the dynamics of H in the materials. So far, there are two materials - hot tungsten at 2000 K [1, 2] and laser ablated silica aerogel at room temperature [3, 4] reported as relatively high yield of Mu production but our focus is generation of Mu at low temperature (below 300 K). In order to understand the formation and emission of the UCMu from the surface of the material, we study n-Si using muon spin rotation and relaxation measurement at low temperatures (7 – 300 K). Initially, based on difference in relaxation rates of Mu stopped deep inside from the surface of the Si and that formed near the surface, we pointed out the possibility of emission of the UCMu from the n-Si surface [5]. However, our distance dependent study (distance of n-Si surface from Ag sheet kept downstream in vacuum) indicates that there may be significant surface effect on emission of UCMu at low temperatures (< 100 K). Results of the distance dependent study will be presented in the symposium.

References

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