Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

High Energy Proton Beam Irradiation Effects on MoS_2 Field Effect Transistors TAE-YOUNG KIM, KYUNGJUNE CHO, WOANSEO PARK, TAKHEE LEE, Seoul Natl Univ — Recently, MoS2 has gained significant attention due to its direct bandgap of 1.8 eV as a single layer. Numerous studies have explored the application of MoS2 in nanoelectronic devices [1]. High energy particle irradiation has been utilized to tailor the electrical properties of nanowire FET devices [2]. Similarly, a few experimental studies have investigated the irradiation effect of MoS2 [3]. However, a comprehensive study of high energy particle beams on MoS2 thin-film FET devices have not yet been investigated. In this study, we investigated the effect of irradiation on MoS2 FETs with 10 MeV proton beams. The electrical characteristics of the devices were measured before and after the proton irradiation with several beam conditions. The observed changes in the electrical properties originate from proton-irradiation-induced traps, including positive oxide-charge traps in the SiO2 layer and trap states at the interface between the MoS2 channel and the SiO2 layer. Our study will enhance the understanding of the influence of high energy particle irradiations on MoS2-based nanoelectronic devices.

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Date submitted: 06 Jan 2014 Electronic form version 1.4