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High Power Heating of Magnetic Reconnection in UTokyo Spherical Tokamak Merging Experiment: TS-U Y. ONO, M. KAWANAMI, K. KIMURA, R. NAKAI, K. NISHIDA, R. ISHIDA, H. YAMANAKA, A. KUWAHATA, H. TANABE, M. INOMOTO, C.Z. CHENG, University of Tokyo, TS AND UTST TEAM — Significant ion heating of magnetic reconnection up to 0.2keV and 1.2keV were documented in two tokamak merging experiments: TS-3 and MAST [1,2], leading us to a new high-field merging experiment: TS-U in University of Tokyo. 1D and 2D contours of ion and electron temperatures measured in TS-3 already revealed clear energy-conversion of magnetic reconnection: huge outflow heating of ions in the downstream and electron heating localized at the X-point[1]. It is noted that the ion heating energy is proportional to square of the reconnecting (poloidal) magnetic field B_{rec} [1,2]. It is because the reconnection outflow accelerates ions up to the poloidal Alfven speed [1]. The accelerated ions are thermalized by shock-like density pileups in the downstreams. These results agree qualitatively with recent solar satellite observations and PIC simulation results [2]. Based on those results, our poster will show the design of upscaled high-field tokamak merging experiment: TS-U. The high-power heating of tokamak merging is useful not only for laboratory study of reconnection heating mechanisms but also for economical startup and heating of tokamak plasmas. The tokamak merging with B_{rec}>0.3T will enables us to heat the tokamak plasma to the burning regime: T_i>5keV without using any additional heating facility. [1] Y. Ono et al., Phy. Rev. Lett. 107, 185001 (2011), [2] Y. Ono et al., Plasma Phys. Cont. Fus. 54 124039, (2012); Y. Ono, Phys. Plasmas in press.

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