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Development of Hybrid Scenario on DIII-D for Burning Plasma Devices,* C.C. Petty, J.C. DeBoo, T.E. Evans, J.R. Ferron, J.E. Kinsey, R.J. La Haye, T.C. Luce, T.H. Osborne, P.A. Politzer, *GA*; H. Reimerdes, *Columbia U.*; S.L. Allen, M.E. Fenstermacher, C.T. Holcomb, *LLNL*; M. Murakami, *ORNL*; E.J. Doyle, *UCLA*; R.A. Moyer, *UCSD* – Experiments on DIII-D have extended the hybrid scenario towards the burning plasma regime by increasing the noninductive current fraction to nearly 100%, and in separate experiments by incorporating edge localized mode (ELM) suppression. Strong core current drive by neutral beam injection and electron cyclotron heating reduced the loop voltage to 0.01 V in hybrids with normalized beta up to 3.5 and an H_{98} factor of 1.4. This demonstrates the potential for hybrids as a high-beta, steady-state scenario that is not sensitive to alignment of the noninductive current profiles. For the first time, large type-I ELMs have been completely suppressed in hybrids at q_{95}=3.6 by applying edge resonant magnetic perturbations using n=3 internal coils. The ELM suppression lasted for 0.5–1.0 times the current redistribution time for normalized beta up to 2.5 and a fusion performance factor equivalent to Q=10 operation in ITER.

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