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Experiments Toward Understanding Impurity Assimilation During Massive Gas Injection for Disruption Mitigation in DIII-D[1] E.M. HOLLMANN, J.A. BOEDO, R.A. MOYER, D.L. RUDAKOV, J.H. YU, UCSD, T.C. JERNIGAN, ORNL, T.E. EVANS, D.A. HUMPHREYS, P.B. PARKS, E.J. STRAIT, J.C. WESLEY, W.P. WEST, GA, M. GROTH, H. SCOTT, LLNL, D.G. WHYTE, MIT — Impurity assimilation following massive gas injection (MGI) is desirable for collisional suppression of runaway electrons (RE). Experiments on the DIII-D tokamak have shown that impurity ions created at the plasma edge by MGI initially mix inward quite slowly toward the plasma core. When the associated cold front reaches the q=2 rational surface, impurity mixing is accelerated due to destabilization of low-order tearing modes, leading to the thermal quench (TQ). Average core mixing efficiencies of impurities injected into the vacuum vessel up through the TQ are of order 10%. Typically, RE suppression ratios $\gamma_{crit} = E_{crit}/E_{||} \approx 0.01$ are obtained using argon. Better suppression ratios $\gamma_{crit} \approx 0.06$ are obtained with low-Z (H_2 or He) injection and firing five MGI valves simultaneously.

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