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Additive Manufacturing of a High Field Side Lower Hybrid Current Drive Launcher from GRCop-84 for the DIII-D Tokamak ANDREW SELTZMAN, STEPHEN WUKITCH, Massachusetts Institute of Technology — We present a high field side (HFS) lower hybrid current drive (LHCD) multijunction launcher for DIII-D. Electric field is reduced below the 9.3 kV/cm arcing threshold by a traveling wave power divider and aperture impedance matching to the edge plasma resulting in low circulating power over a wide range of edge densities (n_e =1x10^{17} to 1x10^{18} m^{-3}). The coupler is expected to drive ˜150 kA/MW at r/a=˜0.6-0.8 at $n_{||}$ =¯2.7 and 4.6 GHz. Additive manufacture with selective laser melting (SLM) from Glenn Research Copper 84 (GRCop-84), a Cr_2Nb precipitation hardened alloy, allows configurations unachievable with conventional machining. SLM of GRCop-84 results in a fully dense, vacuum compatible RF structure. Monolithically printed LHCD launchers with self-supporting RF structures eliminate secondary machining operations. Surface finishing techniques to reduce RF losses in printed material are developed. Material failure, fracture characteristics, and precipitate morphology are examined with electron microscopy and focused ion beam milling. Work supported by the USDOE, OFES, using User facility DIII-D, under Award Number DE-FC02-04ER54698 and DE-SC0014264. This work made use of the MRSEC Shared Experimental Facilities at MIT, supported by the National Science Foundation under award number DMR-14-19807.

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