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The H_2CAP process (Figure 1) aims at converting solid biomass into fuel grade oil through continuous catalytic hydropyrolysis and downstream deep hydrodeoxygenation (HDO). Conventional pyrolysis of biomass produces a high yield of condensable bio-oil at moderate temperature and low pressure[i]. Removal of oxygen from this bio-oil is necessary in order to achieve a stable product with an appreciable heating value. Catalytic HDO is a promising method for bio-oil upgrade, but severe coking of bio-oil upon heating challenges the upgrading of condensed bio-oil[ii]. In the H_2CAP process HDO takes place both during pyrolysis of biomass and downstream on the pyrolysis vapors before condensation. A bench scale experimental setup is being constructed for the continuous conversion of solid biomass (100 g /h) to low oxygen, fuel-grade bio-oil.

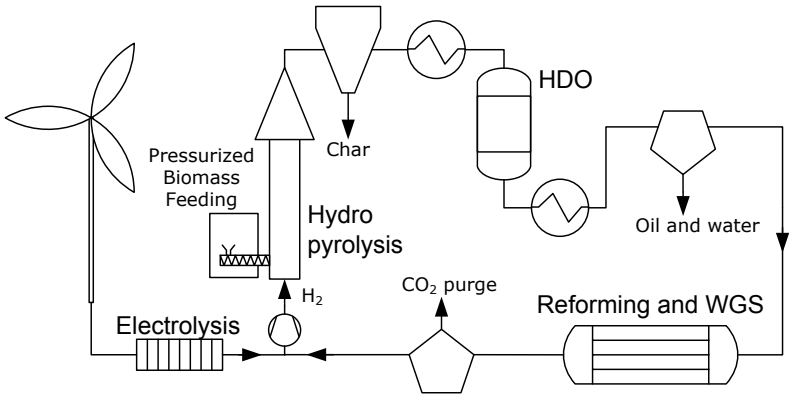

Figure 1 *Proposed process diagram including catalytic hydropyrolysis, char separation, temperature adjustment, deep HDO, liquid separation, pyrolysis gas reforming and water gas shift (WGS). Additional hydrogen may be obtained from water electrolysis.*

Supported CoMoS and NiMoS catalysts show promise in catalytic HDO[ii]. The conversion of different bio-oil model compounds is being tested in order to understand the reaction mechanisms of HDO, to develop active and durable catalysts for hydropyrolysis and HDO and to optimize the operating conditions; all in order to develop a sustainable production of green transportation fuels from biomass.

i) A.V. Bridgwater, Biomass and Bioenergy, 38 (2012), pp. 68-94. ii) P. M. Mortensen, J.-D. Grunwaldt, P.A. Jensen, K.G. Knudsen, A.D. Jensen, Appl. Catal. A: General, 407 (2011), pp. 1-19.