Abstract P2C-2

Power to ammonium nitrate, full cSBO with a proposed starting date on 1 January 2022 and a proposed duration of 30-48 months, with partners KU Leuven, UAntwerpen and VITO. Follow-up project of the currently running Moonshot sprint cSBO project P2C (https://moonshotflanders.be/mot3-p2c/).

Ammonium nitrate is a bulk chemical produced worldwide in large quantities especially for fertilizer applications. With the growing population the market is predicted to grow substantially in the next decades. State-of-the-art ammonium nitrate production proceeds by a combination of the Haber-Bosch process producing ammonia from nitrogen and hydrogen gas, and the Ostwald process in which nitric acid is produced from ammonia. Ammonium nitrate is obtained by the acid-base reaction of ammonia and nitric acid. Ammonium nitrate production is globally responsible for a significant share of greenhouse gas emission of CO_2 and N_2O (a molecule with 310 times stronger global warming potential than CO_2).

We propose a new ammonium nitrate production scheme, combining plasma technology producing NO_x from air with electrocatalytic reduction of the NO_x to produce ammonium nitrate. This integrated process avoids the corrosive nitric acid and anhydrous ammonia intermediates as well as N_2O by-product formation. By combining the formation of ammonium and nitrate in one process, separation and purification processes are minimized. The process is applicable at different scales (small- medium-large) and can fully cope with intermittent green energy supply.

For substantive questions about this project proposal, please contact MOT3 representative Luc Van Ginneken (lvanginneken@catalisti.be; +32 477 979 947).