

# CO<sub>2</sub> electrocatalysis as key technology for the production of high value chemicals

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In order to reduce the human footprint we need to transition to sustainable resources for chemicals and materials. Next to biomass, Avantium is also investigating the use of carbon dioxide as feedstock for the production of chemicals. For several years now, Avantium has been developing a technology platform to electrocatalytically convert carbon dioxide. By bringing in our technology and our capabilities in catalyst research into the area of electrochemistry, we aim to develop a powerful electrolysis technology platform to convert carbon dioxide.

In November 2016, Avantium acquired Liquid Light, a Princeton 2009 start-up in which more than 35 million dollars was invested. Liquid Light has developed proprietary process technology to make major chemicals from CO<sub>2</sub>. The acquisition combines the technologies of both Liquid Light and Avantium to develop a world leading electrocatalysis platform and brings Avantium in the top of the world's Intellectual Property position in carbon dioxide related electrolysis. Using this technology platform Avantium aims to develop an integrated process for the production of high-value C2 chemicals from CO<sub>2</sub>.

Avantium is accelerating this development by participating in 2 consortia within Europe, respectively the OCEAN and the RECODE project. The OCEAN project aims to develop an integrated process for the production of high-value C2 chemicals from carbon dioxide using electrocatalysis. This will be achieved by improving and optimizing the technology just one-step away from commercialization by demonstrating the CO<sub>2</sub> reduction technology at the site of an industrial electricity provider. The industrial relevance will also be demonstrated by the production of high-value C2 products and polymers thereof by developing the process steps needed to produce oxalate, C2 hydrogenation products and polymers. Overall, OCEAN aims at addressing the critical elements that are currently hindering new electrochemical processes by targeting high value products that have the corresponding production margin to introduce this technology on the market, lowering the power costs by combining oxidation and reduction, and a trans-disciplinary approach that is needed for the introduction of these advanced technologies.

The RECODE consortium will develop technology for CO<sub>2</sub> utilization in the context of cement manufacturing. The aim is to synthesize formic acid, oxalic acid and glycine through electrocatalytic and catalytic pathways to be used as hardening acceleration promoters, grinding aids or ionic liquids additives, respectively.

The ultimate goal is to reduce the CO<sub>2</sub> present in the world's atmosphere. The decentralized processing of CO<sub>2</sub> and biobased feedstocks is investigated in the European CELBICON project, where 12 partners from 7 countries will put their key enabling technology developments together. By combining CO<sub>2</sub> adsorption from air, pressurizing, electrolysis, and fermentation, a robust and efficient technology to produce bioplastics and other added-value chemicals from CO<sub>2</sub> and biomass will be developed.