Valorization of CO\textsubscript{2} off-gas to polymers through biotechnological process
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Carbon dioxide or CO\textsubscript{2} is considered to be the major cause of climate change by its accumulation in the atmosphere and its greenhouse properties. To counteract climate change, most research focused in the past on Carbon Capture and Storage (CCS). Nowadays it is recognised that rather than just storing it, emitted CO\textsubscript{2} can be a valuable source of carbon for the production of commercially valuable products. This is known as Carbon Capture and Utilization (CCU), an approach providing much needed additional capacity in the move towards a low carbon economy.

**CO\textsubscript{2}-Based Polymers**

CO\textsubscript{2} from industrial point sources and renewable H\textsubscript{2} can be converted into the biopolymer polyhydroxybutyrate (PHB) via fermentation. This CCU approach can answer multiple needs:

- production of polymers without the use of petroleum-derived or agricultural feedstock
- replacement of petroleum-derived plastics with biodegradable renewable products
- capture of CO\textsubscript{2} to prevent greenhouse gas accumulation.

**Demonstrator**

CO\textsubscript{2}-rich off-gas stream of a biogas producing plant with biogas upgrading was sampled and pressurised on site, and transported to VITO to evaluate the feasibility of PHB production from these CO\textsubscript{2}-rich off-gases.

**Conclusions**

The poster illustrates the technical feasibility of PHB production from CO\textsubscript{2} off-gas in presence of impurities using a two-stage cultivation system. The main challenge lies in increasing the mass transfer rate of O\textsubscript{2} for obtaining high PHB productivity and PHB concentration from CO\textsubscript{2}.

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