Technology offer:
3D printing of sorbents and catalysts

ECN has developed detailed material and process knowledge that enables the development of catalytically active materials and sorbents using emerging manufacturing technologies such as additive manufacturing (3D printing) of 3D printed products and/or components based on metals, ceramics, and combinations of both. Based on these developments, we see the opportunity to develop new catalysts, sorbents and reactor types with a higher conversion efficiency and/or advancements in continuous production compared to the state-of-the-art.

Key words: Additive Manufacturing; Sorbents: Catalysts; process efficiency; continuous production; micro reactors; energy efficiency; 3D printing

Description

- ECN and Formatec Technical Ceramics B.V. have developed the technology to 3D print ceramics. This has resulted in the creation of a new venture: www.admatec.nl
- ECN has further developed this technology and successfully demonstrated (proof of principal) that it is possible to print metals based on the same technology.
- Based on this experience ECN successfully:
  - developed a process to directly 3D-print (chemically active) CO2 sorbent material;
  - demonstrated a 3D-printed catalyst support structure.
- ECN has developed detailed material and process knowledge that enable the development of other catalytically active materials and sorbents using emerging manufacturing technologies such as additive manufacturing (3D printing) of 3D printed products and/or components based on metals, ceramics, and a combination of both.

New and innovative aspects

- Free form production of sorbents
- Free form production of catalysts
- Free form production of reactor designs
- Free form production of support structures
- Integrated micro reactors

Main advantages of its use

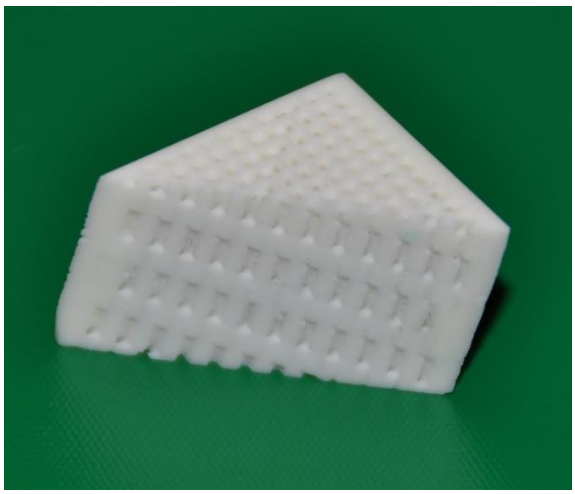
Based on our current knowledge this technology has the potential to:

- Increase conversion rates
- Reduce energy use
- Improve utilization / capacity factor
- De-bottleneck existing reactors
- Overall optimization of reactor and process.

Please note these (potential) advantages still have to be experimentally confirmed.

Specifications

- Current build size 115 x 64 x 125 mm with 60 micron resolution in several types of technical ceramics or metals.



▲ *Fig. 1: 3D printed catalyst support structure.*

Potential applications

- Sorption processes
- Catalytic processes
- (Micro) reactors

State of development

- Proof-of-principal for the printing of a sorbent
- The technology is still in a very early stage and will require several years of R&D to bring it to a commercial scale.

Transaction type and partner profile

- Spin-off and /or (exclusive) license.
- ECN is looking for partners with a strong entrepreneurial and managerial track record, with extensive experience in the petro-chemical industry, who are able to give this proposition a razor sharp focus and are able to raise the necessary funding to further develop this technology and to bring it to the market.

Publications and IP

- A patent application has been filed (status: patent pending)
- ECN has many years of experience and know-how in the field of technical ceramics, catalysis, sorption and reactor development.

For more information, please contact: Sjoerd Wittkampf, Technology Transfer Manager
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