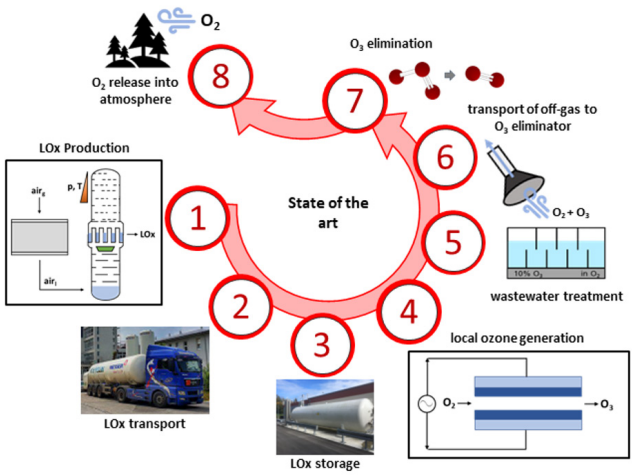
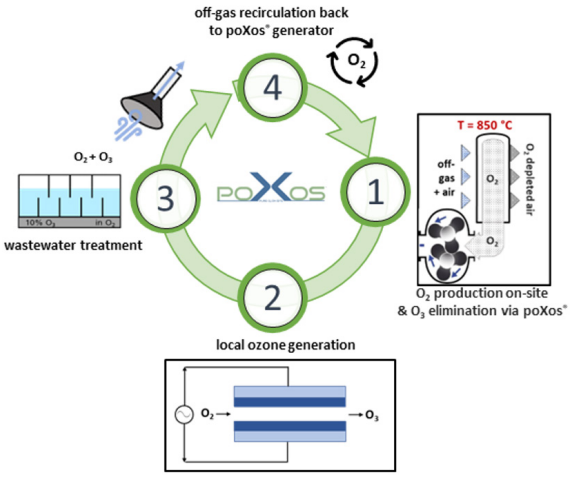
Minimized O_2 costs for ozonation with poxos®



State of the art in wastewater treatment.



Wastewater treatment with poXos®.

A team of founders at Fraunhofer IKTS works on the commercialization of membrane plants for local oxygen production. In 2024, corresponding devices will be available under the trademark poXos® (pure oxygen on site).

poXos® generators for ozonation

Wastewater treatment with ozone particularly benefits since delivery, storage and evaporation of LOx (cryogenic Liquid Oxygen) are not needed anymore. In addition, the oxygen rich off-gas is recirculated and fed into the poXos® generator again. For the first time, the oxygen is completely utilized. Additionally, the ozone eliminator is unnecessary. If the poXos® generator is operated with sustainably generated electricity, the oxygen supply is 100 % CO_2-neutral.

Lowest operating costs and CO_2 emissions

The electricity demand of the patented process is typically below 0.25 kWh per Nm³ O_2 if gas (sewage gas) is burned for heating. Therefore, the operating costs are significantly lower than for a LOx supply. Furthermore, CO_2 emissions can be lowered by at least 50 %. Assuming an oxygen demand of 500,000 m³ O_2 per year and an oxygen price of 0.25 €/m³, savings of approx. 100.000 € are achievable.

Unique Selling Proposition (USP) of poXos®

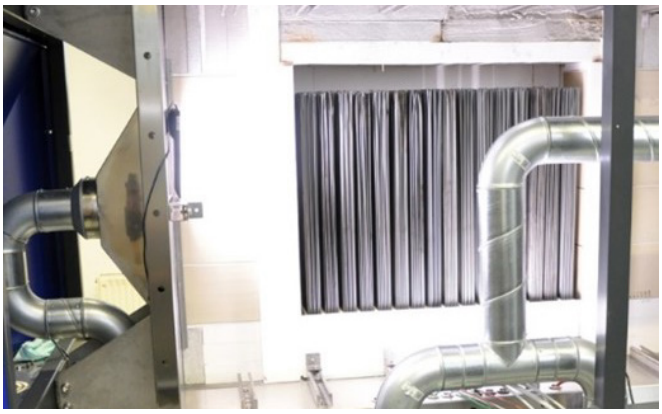
- Lowest energy costs due to sustainable heating using sewage gas
- High purity, sterile, dry O_2 as required
- Simplified process chain due to off-gas recycling and inherent O_3 elimination
- Scalability and recyclability

Dr. rer. nat. Ralf Kriegel
Fraunhofer Institute for Ceramic Technologies und Systems IKTS
Michael-Faraday-Strasse 1, 07629 Hermsdorf, Germany
Phone +49 36601 9301-4870
ralf.kriegel@poxos.eu

721-W-23-4-11

poxos® – MIEC membranes and smart O_2 generators

Fraunhofer IKTS



Heating chamber of poXos® generator.

Prototype of a poXos® generator.

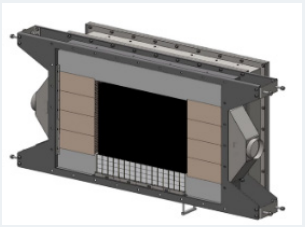
Ceramic membrane modules.

MIEC membranes (MIEC – Mixed Ionic Electronic Conductor) also called ITM (Ion Transport Membrane) or OTM (Oxygen Transport Membrane) have been developed at Fraunhofer IKTS for years. Their ability to separate oxygen is based on the combined conductivity for oxide ions and electronic charge carriers at sufficient high temperatures (> 700 °C). The driving force for the separation process is the gradient of the oxygen partial pressure across the membrane generated by vacuum.

From raw material to MIEC membrane

The ceramic material is synthesized via solid state route at Fraunhofer IKTS. Membrane manufacturing is done by stiff-plastic extrusion of a plasticized mass followed by drying and firing. The finished membranes show outer diameters of ~3 mm and a wall thickness of ~0.3 mm at a length of ~70 cm. Currently, the production capacity at Fraunhofer IKTS amounts to approximately 10,000 membranes per year.

Modular design – poXos® generator



From the MIEC membrane to poXos® generator

The poXos® devices are based on a smart modular design. One membrane module contains ~150 membranes and gets lined up with up to 15 other modules. Further increase of the oxygen throughput is achieved by combining several module lines. During operation, the produced oxygen amount is adjusted according to the operator's requirements by controlling the feed-air flow and the vacuum pressure on the membranes' permeate side. Currently, up to 60 Nm³/h O_2 can be produced during continuous operation of the poXos® generators.

poXos

Dr. rer. nat. Ralf Kriegel
Fraunhofer Institute for Ceramic Technologies und Systems IKTS
Michael-Faraday-Strasse 1, 07629 Hermsdorf, Germany
Phone +49 36601 9301-4870
ralf.kriegel@poxos.eu

eXIST Existenzgründungen aus der Wissenschaft

Federal Ministry for Economic Affairs and Climate Action

721-W-23-4-11