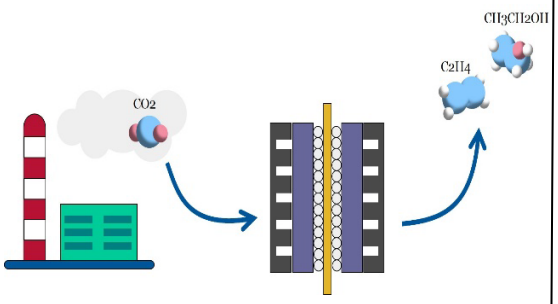
UNIVERSITY OF WATERLOO

TECHNOLOGY SUMMARY



Reference
10208

Patent status
US Provisional Patent, 63/473,924

Stage of development
Prototype in the lab

Contact
Scott Inwood
Director of Commercialization
Waterloo Commercialization Office
519-888-4567, ext. 43728
sinwood@uwaterloo.ca
uwaterloo.ca/research

Single atom alloy catalyst for electrocatalytic CO_2 reduction

Background

Climate change induced by a variety of human greenhouse gas emitting activities has the potential to negatively impact our natural environment, public health, and nation state economies. Carbon dioxide (CO_2) is one such greenhouse gas targeted for significant reduction by numerous international conventions\treaties and in some jurisdictions is subject to carbon tax penalties. There is thus a demand for technologies to reduce CO_2 emissions to assist industry sectors (such as oil\gas, chemical, steel, and transportation, etc) to meet reduction targets. Current electrocatalytic methods to convert CO_2 into valuable C_1 and C_{2+} products suffer from low Faradaic efficiency rendering such methods economically impractical.

Description of the invention

C_{2+} products have higher energy density and thus higher economic value than C_1 products. A novel catalyst material has been developed which can convert CO_2 to multi-carbon products (e.g. ethylene, ethanol) which, when factoring in the use of a renewable electricity source, results in high faradic efficiency (94%) making the conversion economics viable.

Advantages

For industries with a source of on-site (or nearby adjacent and accessible) renewable electricity, this technology will lower the cost for industries to convert CO_2 to ethanol and ethylene or other value-added products. In addition to producing valuable products, the associated lowering of CO_2 may represent a source of carbon credits that can be used to offset other operating emissions or sold into the carbon credit marketplace.

Potential applications

- Reduce CO_2 emissions at industrial sector sources
- Produce ethanol and ethylene as selling products
- Energy storage device for electricity (as chemical energy in ethanol, electricity being regenerated using fuel cell)