Adsorption and electrooxidation of dimethyl ether on Pt/MOx-C catalysts

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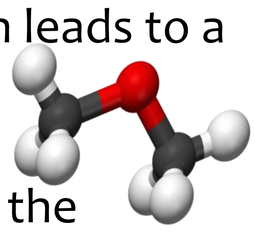
Dimethyl ether

+lack of C-C bond makes complete direct electro-oxidation possible with minimal kinetic losses

+the high number of electrons required for complete oxidation is 12, while methanol has 6, which leads to a high specific energy of such a fuel cell

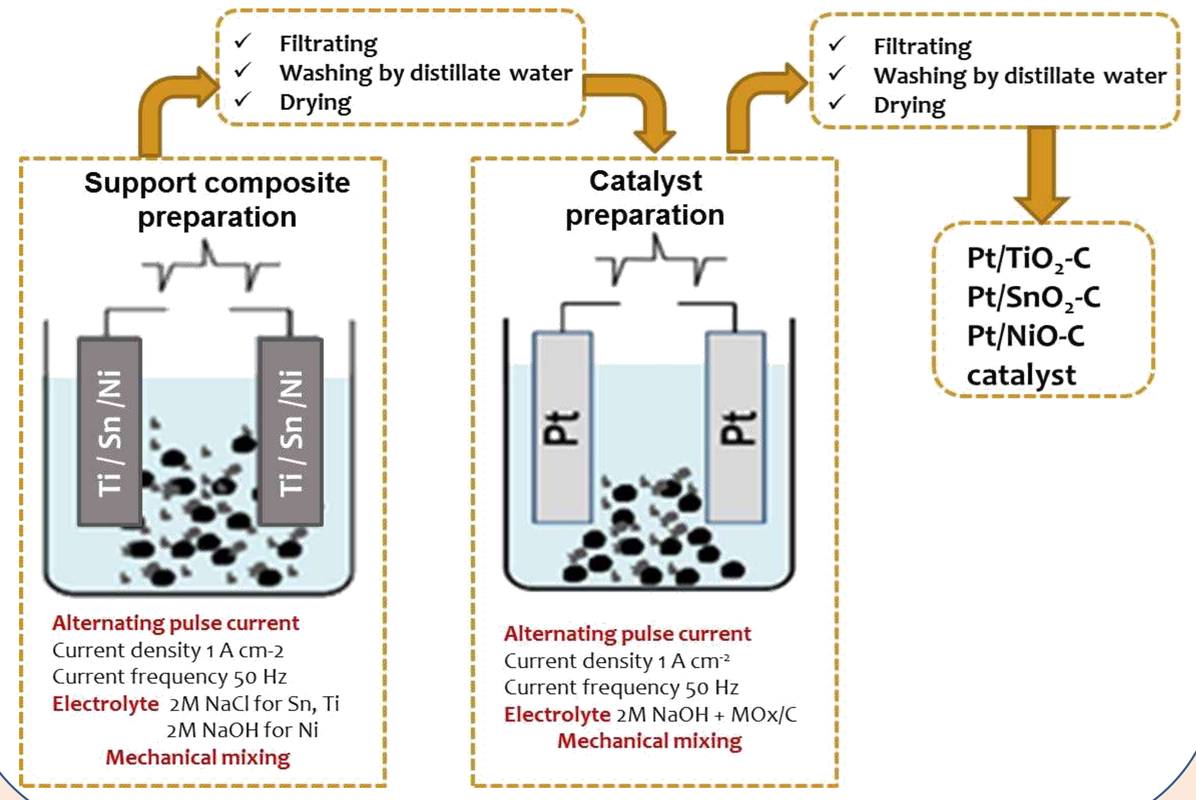


+low dipole moment reduces crossover into the cathode space

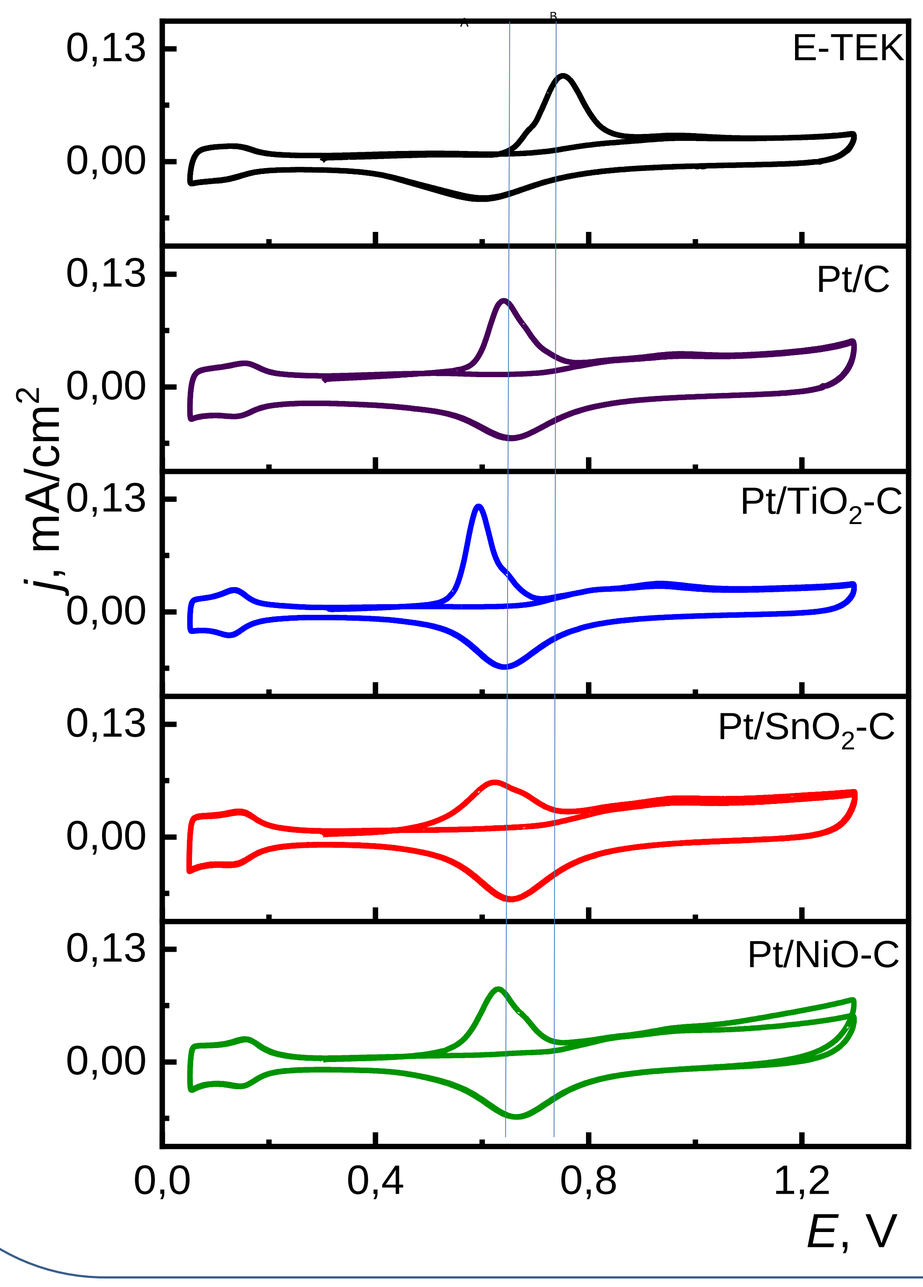
+DME is less toxic than methanol, decomposes in the atmosphere in several tens of hours

+widely used as a refrigerant and propellant in aerosols

Electrochemical preparation of Pt/MOx-C catalysts (M= Ti, Sn, Ni)



Characterization



CO-stripping on Pt/MOx-C catalysts compared to Pt/C and E-TEK catalysts in 0.5M H2SO4 at scan rate 20 mV s-1. Line A – onset potential of CO oxidation, line B – potential of CO oxidation peak

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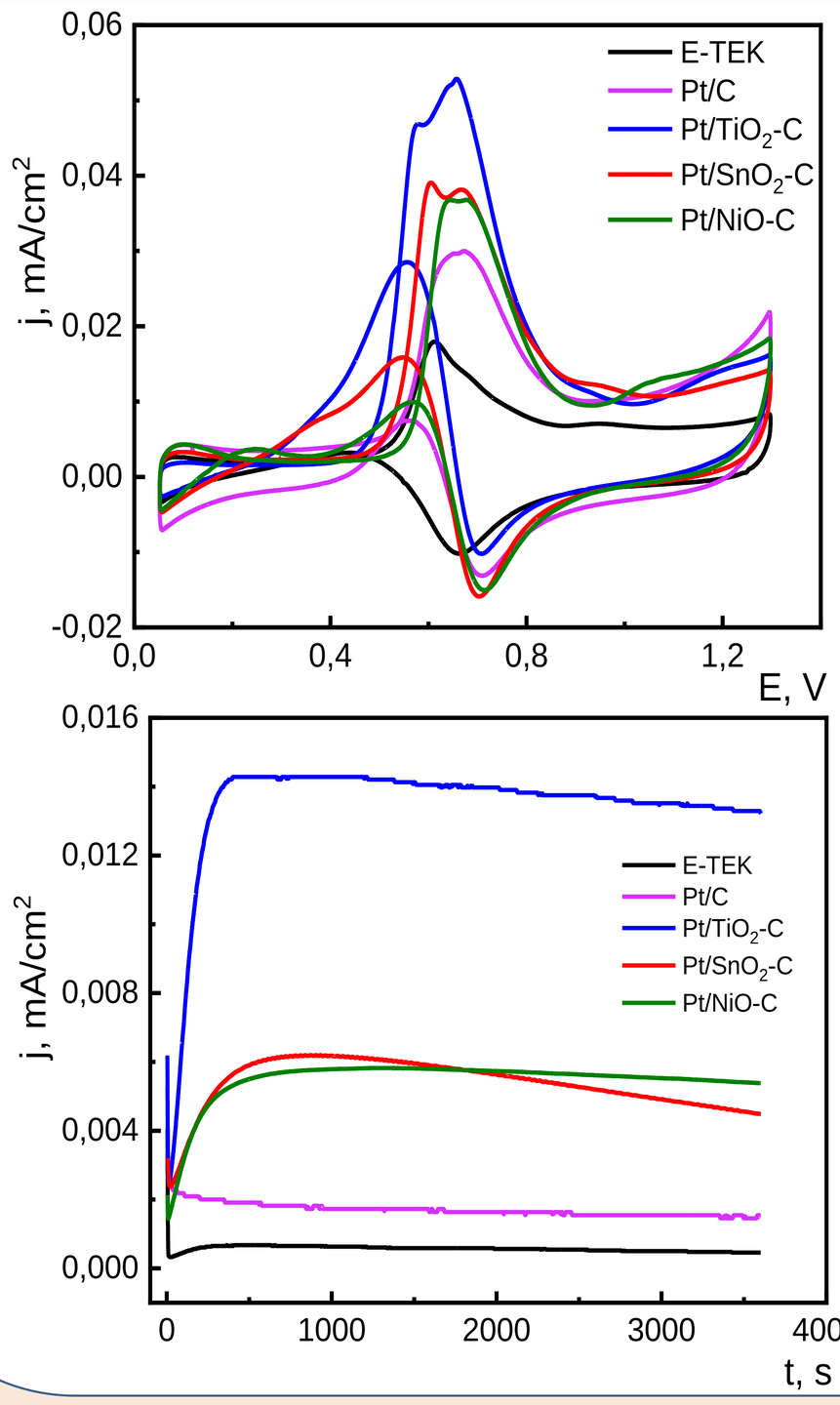

Conclusions

- *the presence of an oxide component in the composition of the hybrid carrier provides a higher rate of the limiting stage of oxidation of strongly chemisorbed intermediate particles, and also facilitates the activation of the CH bond in the methyl groups of the ether*
- *the electrooxidation of DME on catalysts was studied, of which catalysts on an oxide substrate containing titanium in their composition showed the best characteristics.*
- *a high activity of the obtained catalysts on hybrid supports was noted, exceeding the activity of a commercial catalyst by more than an order of magnitude*

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