Electrochemical promotion of NO reduction by hydrogen on a platinum/polybenzimidazole catalyst - DTU Orbit (09/12/2018)

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The electrochemical promotion of catalytic NO reduction by hydrogen was studied using a (NO, H₂, Ar), Pt polybenzimidazole (PBI)-H₃PO₄/Pt, (H₂, Ar) fuel cell at 135°C. A mixture of NO/H₂/Ar was used as the working mixture at one electrode and a mixture of H₂/Ar was used as reference and counter gas at the other electrode. Products of NO reduction (N₂ and H₂O) were analyzed by an on-line mass spectrometer. At high NO+H₂+Ar flow rate (17 mL/min; 17 and 354 mL/min, respectively, at atmospheric pressure) the maximum rate enhancement ratio was 4.65. At low NO+H₂+Ar flow rate (17 mL/min; 17 and 140 mL/min, respectively), NO reduction increased 20 times even without polarization compared to the high gas flow rate. The electrochemical promotion effect occurs at positive polarization with a maximum increase at approximately 0.08 V and with 1.5 times the zero polarization value. The promotion at the negative polarization can be attributed to the electrochemical production of the promoters. At low gas flow rates, a charge-induced change of the strength of chemisorptive bonds can take place.

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