

**Atomically dispersed Rh active sites on oxide supports with controlled acidity  
for gas-phase halide-free methanol carbonylation to acetic acid**

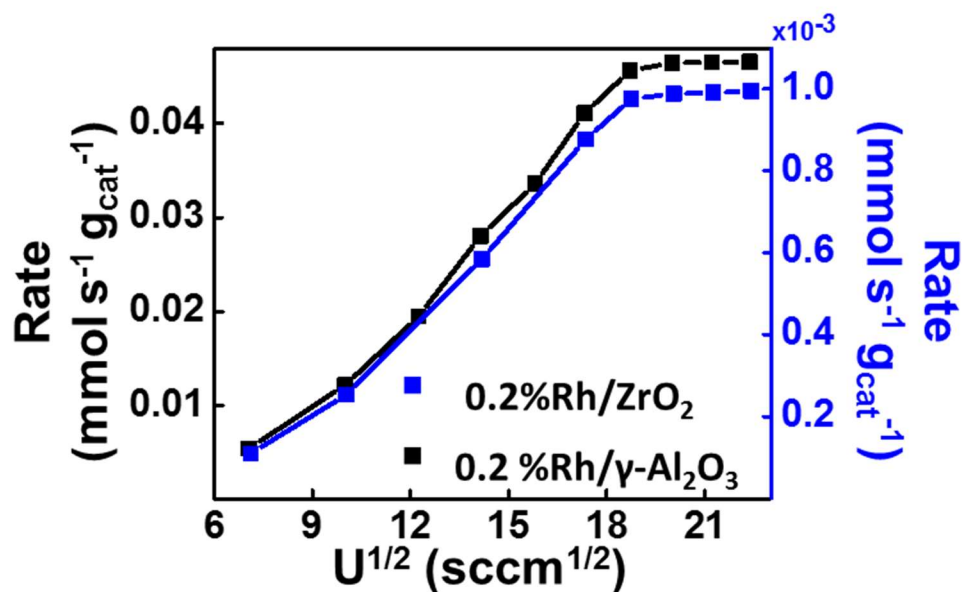
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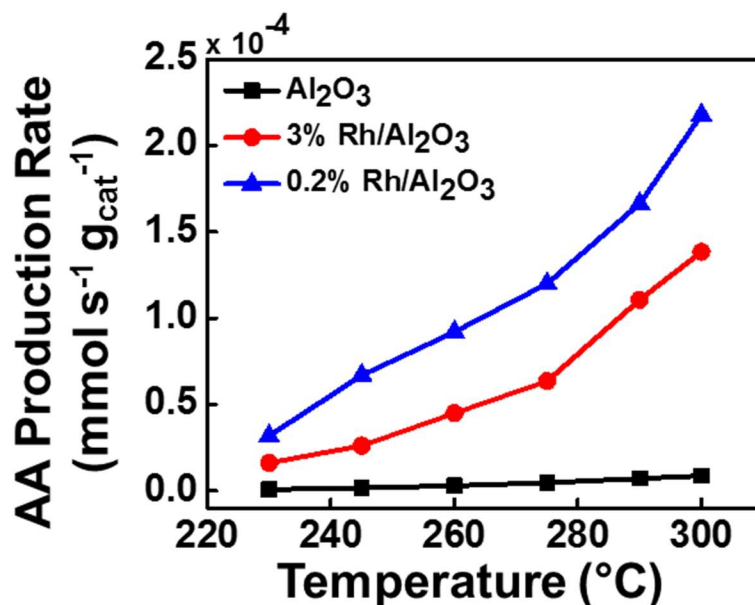
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**Figure S1:** Methanol consumption rates as function of superficial velocity

**Figure S2:** Acetic acid production rate during methanol carbonylation on  $\gamma$ -Al<sub>2</sub>O<sub>3</sub>, 3 wt% Rh/  $\gamma$ -Al<sub>2</sub>O<sub>3</sub> and 0.2 wt% Rh/  $\gamma$ -Al<sub>2</sub>O<sub>3</sub>



**Figure S1.** Methanol consumption rates at 300 C and 33 mbar methanol and CO as a function of the square root of the superficial velocity. 0.2 wt% Rh/  $\gamma$ -Al<sub>2</sub>O<sub>3</sub> and 0.2 wt% Rh/ZrO<sub>2</sub> showed rates independent on the superficial velocity starting from 350 cm<sup>3</sup> min<sup>-1</sup>. A superficial velocity of 350 cm<sup>3</sup> min<sup>-1</sup> (140 cm<sup>3</sup> min<sup>-1</sup> of Ar to purge methanol and 210 cm<sup>3</sup> min<sup>-1</sup> of 10% CO/90% Ar) was chosen for all kinetic experiments.



**Figure S2.** Production rate of acetic acid dur methanol carbonylation at 33 mbar methanol and 33 mbar CO as a function of temperature on  $\gamma$ -Al<sub>2</sub>O<sub>3</sub>, 3 wt% Rh/  $\gamma$ -Al<sub>2</sub>O<sub>3</sub> and 0.2 wt% Rh/  $\gamma$ -Al<sub>2</sub>O<sub>3</sub>. Before reactivity experiments, catalysts were oxidized at 350 °C for 1 hour.