

**Palladium complexes bearing bis-aldimine N<sup>C</sup>N and N<sup>N</sup>N pincer ligands;  
A study of homogeneous/heterogeneous catalyzed CO<sub>2</sub> hydrogenation**

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**A B S T R A C T**

Widespread consumption of fossil resources yielding waste CO<sub>2</sub> has reached an all-time high and this poses an environmental threat that is contributing to global warming and climate change. Using CO<sub>2</sub> as a C<sub>1</sub> source may serve as an avenue to convert waste to valuable platform chemicals such as formates. In this contribution, we report on the design and synthesis of new pincer Pd(II) N<sup>C</sup>N and N<sup>N</sup>N complexes. Herein, we investigate the role of an N<sup>C</sup>N or N<sup>N</sup>N ligand backbone in Pd(II) pre-catalysts and the corresponding catalytic activity in CO<sub>2</sub> hydrogenation. Catalytic activity and selectivity with TON (turnover number) up to 537, in a THF/H<sub>2</sub>O biphasic (affording catalyst separation) system, was achieved. The CO<sub>2</sub>-to-CH<sub>3</sub>OH conversion sequence in the presence of an amine using these Pd pincer catalysts is also investigated.