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Olefin Metathesis: What Have We Learned about Homogeneous and Heterogeneous Catalysts from Surface Organometallic Chemistry? †

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Abstract. Since its early days, olefin metathesis has been in the focus of scientific discussions and technology development. While heterogeneous olefin metathesis catalysts based on supported group 6 metal oxides have been used for decades in the petrochemical industry, detailed mechanistic studies and the development of molecular organometallic chemistry have led to the development of robust and widely used homogeneous catalysts based on well-defined alkylidenes that have found applications for the synthesis of fine and bulk chemicals and are also used in the polymer industry. The development of the chemistry of high-oxidation group 5–7 alkylidenes and the use of Surface Organometallic Chemistry (SOMC) principles unlocked the preparation of so-called well-defined supported olefin metathesis catalysts. The high activity and stability (often superior to their molecular analogues) and molecular-level characterisation of these systems, that were first reported in 2001, opened the possibility for the first direct structure–activity relationships for supported metathesis catalysts. This review describes first the history of SOMC in the field of olefin metathesis, and then focuses on what has happened since 2007, date of our last comprehensive reviews in this field.

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