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## Oxidative Synthesis of Methylchlorid from Methane

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Methane is not widely used as a feedstock by the chemical industry because the selective activation of the C-H bond presents a formidable challenge. The need to utilize methane efficiently as an alternative chemical feedstock is becoming more urgent due to diminishing proven reserves and increasing consumption of crude oil. Most acute is the problem of so-called “stranded methane” at remote locations where it cannot be used as fuel due to a lack of infrastructure and cannot be flared due to environmental concerns.

Here, we report on a new catalytic chemistry for selective formation of methyl chloride by a reaction of methane, hydrogen chloride and oxygen. Our results suggest that oxidation-reduction reactions proceed on the surface of an irreducible lanthanum-based catalyst. The produced methyl chlorides can be further processed using proven technology.

The La catalysts are prepared *in situ* from pure unsupported LaOCl and the bulk material formed is $LaCl_3$. Methane activation is related to electrophilic Cl species that are being generated *in situ* in the oxidative atmosphere. Relations between the potential active sites at the surface, (surface) structure and reactive species are being discussed. DFT calculations are used to propose a plausible reaction pathway. Potential and limitations of this route of alkane activation will be discussed.