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Catalytic oxidative cracking of light alkanes to alkenes: A review

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Catalytic oxidative cracking is as an alternative route to steam cracking for the production of light alkenes. It is combination of heterogeneous and homogeneous reactions; where reaction is initiated on the catalyst surface via alky radical generation followed by thermal gas phase cracking. Various catalyst systems have been attempted in literature for the catalytic generation of alkyl radicals at moderate temperatures (550–650 ^{O}C). These include; Li/MgO, Li/Y_2O_3, Au/La_2O_3, Au-SCZ (gold supported on sulfated zirconia), BiOCl, B_2O_3/Al_2O_3, Co-N/Al_2O_3 and Pt/Al_2O_3 monoliths. In addition to catalytic initiation of radicals, alkyl generation using non-equilibrium plasma is studied. Plasma-catalysis in oxidative cracking induces synergy effects and introduces significant improvement in yields of alkenes, however further understanding of plasma chemistry needs to be elaborated. Minimizing CO_2 production and maximizing yields of valuable C_2-C_4 alkenes remains the bottleneck for the commercialization of oxidative cracking process. Future research should focus on reactor design and on developing optimized reactor catalyst systems. A review on various catalyst systems attempted for oxidative cracking of light alkanes to alkenes will be presented.

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