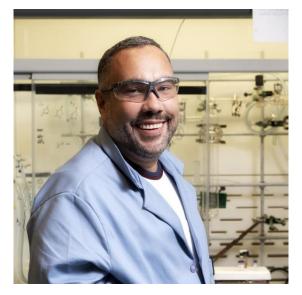
## Taming and Functionalizing Volatile Alkanes by Using Organometallic Reagents

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Host: Titel Jurca

Catalytically converting natural resources such as methane and ethane, the main components of natural and shale gas, into more value-added materials under mild conditions, is one of the main objectives in my research program. I will start by presenting the reactivity of a transient titanium alkylidyne (PNP)Ti=C<sup>t</sup>Bu (pincer PNP = N[2-P(CHMe<sub>2</sub>)<sub>2</sub>-4-methylphenyl]<sub>2</sub>-), specifically how this species forms and engages in intermolecular C-H activation and dehydrogenation reactions. Such a system can dehydrogenate methane, and react with C2-C8 alkanes selectively by activating their alpha- and beta-positions. In the case of linear alkanes C4-C8, we only observe formation of the terminal olefin adduct. A new catalytic cycle for transfer dehydrogenation of alkanes will be also introduced in addition to unique platforms to form kinetically stable Till reagents or Ti=CH<sub>2</sub> motifs, some of which are relevant to our proposed catalytic cycle. In the last component, I will introduce the use of well-defined Ir catalysts for the monoborylation of methane. Combining high-throughput screening and immobilization strategies have allowed for the discovery of some of the most active and recyclable catalysts known for controlled methane functionalization.