

**The production of hydrogen from methane using non-thermal plasma: a feasibility study - Grant Awarded £ 37,836**

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**Summary**

A mixture of methane and oxygen or carbon dioxide is subjected to a plasma discharge in the presence of a suitable catalyst. The electrons produced in the catalysts decompose the methane and oxidant producing excited species, dissociated species and free radicals. This begins a sequence of chemical reactions that can convert the waste greenhouse gases, methane and carbon dioxide, into more valuable fuels such as hydrogen and methanol. The combination of plasma and catalyst offers a very energy efficient method of reforming the methanol compared with current technologies such as steam reforming that is conducted at high temperatures with problems of corrosion and catalyst poisoning. The plasma-catalysis system works at close to ambient temperatures and causes minimal degradation and coking of the catalysts giving a more sustainable solution to the production of these alternative “clean” fuels. The investigation will study the factors that determine the extent of methane conversion and the selectivity for the formation of hydrogen and methanol. We will attempt to vary the parameters to optimise the processing outcomes. We will gain an understanding of the plasma chemistry that governs conversion and selectivity by developing a global model for the chemical reactions involved in the processing that will explain the experimental results and which can be extended as predictive to optimise the design of future systems.