Dielectric Barrier Discharge Methane Conversion

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Drexel plasma institute, Drexel university — With the large amount of nature gas
discovery every year, there is an increasing interest on modification of methane.
The fact that methane is gaseous makes it less economic and efficient than liquid
fuel. Here we propose a new way of converting methane from gas phase to liquid
phase. Dielectric barrier discharge is used to treat methane and nitrogen mixture
bubbles inside of liquid fuel. Nitrogen is here to help activate methane into an
excited state, then it is possible for the excited molecules to react with other liquid
hydrocarbon. Gaseous methane is converted in to liquid phase when excited methane
replace a hydrogen and add onto the carbon chain. In this study some preliminary
experiments is done to verify this hypothesis. There is equivalent weight increases
with methane and nitrogen mixture discharging in diesel when compare to only
nitrogen discharging in diesel. The same experiment have also been done with
gas mixture discharged in 1-methylnaphthalene. And FTIR analysis of the after
treatment hydrocarbon liquid all indicates that there is an increasing in C-H bond
concentration and a decreasing in phenyl ring structure.