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Microsparks Generated by Charged Particles in Dielectric Liquids ROBERT GEIGER, Texas A&M University, DAVID STAACK TEAM — The electrodynamics of charged particles in dielectric liquids have been described by several authors [1,2]. As a charged particle approaches an electrode of opposite charge the local electric field eventually exceeds the dielectric strength of the liquid and a microspark is generated. These plasmas can be very small, about < 5 μm, and may exhibit non-thermal behavior. Such non-thermal behavior can provide interesting and efficient chemical reactions [3]. An understanding of the plasma properties for this type of discharge can provide a simple means of generating non-thermal plasmas in dielectric liquids, such as oils or other hydrocarbons, which can be used to chemically process the liquids. Such a technology may lead to a highly efficient method of heavy oil upgrading which can be easily scaled. In order to understand the plasma properties optical emission spectroscopy is carried out for various hydrocarbons and voltage-current characteristics are used to determine the energy cost for this process.

[1] Melcher, James R. Continuum Electromechanics. Cambridge, MA: MIT Press, 1981.
[2] Jones, Thomas B. Electromechanics of Particles. Cambridge University Press 1995.
[3] Staack, D., Fridman, A., Gutsol, A., Gogotsi, Y. and Friedman, G. 2008, Angew. Chem., Int. Ed. 47, 8020.

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