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Kilo-Hertz alternating current pulsed discharge in insulated liquid

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Discharge in liquid has been researched for about half century since the 1960s, but the theories of discharge in liquid are of great variety. We can simply classify those researches into direct current discharge in liquid, radio frequency (RF) discharge and microwave discharge in liquid and pulse discharge in liquid according to the frequency of the power source. We can also classify those researches into insulated liquid discharge and uninsulated liquid discharge. And the mostly used liquid in those researches is water at recently. Liquid nitrogen and liquid helium are also used in 60s of the last century. The mechanisms of discharge in liquid are concluded into field ionization theory, heat generated bubble and field ionization with heat generated bubble. This article mainly study the discharge in insulated organic mixed liquid such as oxalic acid dissolved ethanol and ethanol-water with an alternating current of 8 kilo-Hertz in room temperature. The electrical parameters and discharging spectrum were logged while discharging to optimize the discharge process. The products of discharging were Raman spectra analyzed to identify the components. Then the processes of the discharging were analyzed according to the spectrum and the electrical parameters and the probably chemical reaction were listed according to the characteristic absorption band in the spectrum.
The power source is an alternating current power source whose frequency can be changed between 6 to 20 kilo-Hertz and the insulated liquid used are oxalic acid dissolved ethanol and ethanol-water. Different electrical parameters were measured in different concentration to find the best discharge parameters. Possibly chemical reactions were listed according to the characteristic peaks of spectrum and discharging electrical parameters. The mechanism of discharge in liquid concluded according to the experiments is that the discharge is generated due to the asynchronously vibration of electron and molecule in time varying electric field.

Author: TANG, Xiaoliang (Donghua University)

Co-authors: Mr DONG, Siyuan (Department of Applied Physics, College of Science, Donghua University.); Mr GUO, Shaomeng (Department of Applied Physics, College of Science, Donghua University.); Prof. QIU, Gao (Department of Applied Physics, College of Science, Donghua University.); Mr WEN, Dan (Department of Applied Physics, College of Science, Donghua University.)

Presenter: TANG, Xiaoliang (Donghua University)

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