

Spray-discharge in “air–conductive water” mixture

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A study of the effect of spray on the breakdown characteristics of the discharge gap has been carried out. The development of electric discharge in a two-phase medium (spray of a conductive liquid), the so-called spray discharge was studied. The conditions for the generation of the discharge are investigated in the region of motion of the spray droplets. An experimental setup has been developed that allows generating an electric discharge in a spray (spray torch) and simultaneously photographing the process, including shadow microphotography. The characteristics of liquid spraying were measured in order to determine the effect of the discharge on the droplet parameters at various time-averaged energy inputs into the medium. The value of the breakdown voltage was obtained, which turned out to be much less than the breakdown value of air, even in the case of relatively low water conductivity. It is shown that although the presence of a two-phase medium significantly reduces the breakdown voltage of the interelectrode gap, the discharge practically (except of velocity of droplets) does not affect the spray parameters. Detailed characteristics of the spray were obtained: average droplet diameter, Sauter diameter, distribution of velocity vector components over diameters. It is shown that the spray discharge allows the generation of sterilizing gases (ozone, nitrogen compounds), as well as potentially other compounds, the type of which is determined by the composition of the spray liquid, which can have a number of technological applications. The presence of relatively strong electric field can notably change the velocity of droplets in spray torch.

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