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Plasma effects on microbubble formation in gas-liquid interface across a microfluidic plasma reactor

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Atmospheric-pressure plasmas has increasingly been studied for their potential in many applications, such as water treatment, generation of reactive species, biological applications, and material synthesis. This study involves the use of atmospheric-plasma in microscale to transfer plasma reactive species to organic liquid via microbubbles gas-liquid interface. Hence, plasma interaction with microbubbles is a topic to investigate. An innovative microfluidic reactor has been designed for this study. This device is also capable of transferring plasma reactive species into various aqueous solution for treatment. The microfluidic device is a cross-junction co-flowing regime that generates microbubbles This device is likewise a dielectric barrier discharge (DBD) plasma, that is facilitated by using two aluminum tapes, acting as electrodes, placed in the bulk of the device across the gas flow microchannel to generate an electric discharge. So far, the device has been used to investigate the effect of plasma discharge on a conventional gas-liquid microbubble formation in microfluidics. This was conducted by observing the formation and size of the microbubbles with plasma (electric field applied on the gas flow) and without plasma. It was observed that the plasma discharge resulted in an increase on the microbubble size and an alteration in the formation mechanism. It was concluded that the primary factor for these effects was a variation in the volumetric flow of the gas when the gas is discharged. The change in temperature between the gas and the plasma was analyzed.

Biography

Oladayo Ogunyinka has completed his master's degree in mechanical engineering at the age of 22 years from the University of Sheffield, UK. He is currently a research student in microfluidics and plasma field at Loughborough University, UK.

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