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Plasma temperatures inside cavitation induced by a shrimp-inspired mechanical device[1] XIN TANG, MATTHEW BURNETTE, KUNPENG WANG, CHRISTOPHER CAMPBELL, DAVID STAACK, Texas AM University — In nature, marine animals like snapping shrimp use the cavitation mechanism for hunting, defense, communication, and tunneling activities. In previous research, a manually triggered shrimp-inspired mechanical device was developed and plasma formation was observed in the collapsing cavitation created by this shrimp-like device. The temperature inside the collapsing cavitation is an important plasma parameter for physical and chemical processes. An upgraded automatic snapping version of the shrimp-inspired device with a higher snapping frequency around 0.83 Hz was invented to explore the shrimp cavitation mechanism in a broad range of applications. Since the light emission is so weak, it can be hardly observed by unaided eyes. The light emission was increased by this automatic snapping as well as noble gas doping, making it possible for further spectrum analysis. The emission lines in the cavitation spectrum can be utilized for temperature estimation. Cavitation compression is an effective energy focusing process for plasma generation in liquids. With the measurement of the plasma temperatures, the actual plasma generation efficiency can be estimated.

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