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Long and Highly Flexible Micro-Plasma Jet Device for Endoscopic Treatments JAE YOUNG KIM, DANIEL CUTSHALL, Department of Electrical and Computer Engineering, Center for Optical Materials Science and Engineering Technologies, Clemson University, THOMAS HAWKINS, JOHN BALLATO, School of Material Science and Engineering, Center for Optical Materials Science and Engineering Technologies, Clemson University, SUNG-O KIM, Department of Electrical and Computer Engineering, Center for Optical Materials Science and Engineering Technologies, Clemson University — A long and highly flexible micro-plasma jet device made of hollow-core optical fiber has been proposed for use in endoscopic treatment. The fiber which is used has an inner diameter of 350 μm and an outer diameter of 700 μm. The plasma jet device was 165 cm in length and merely 2 millimeters wide at the widest point. The system was configured so that thin wire electrodes were isolated inside of the optical fibers, thereby not allowing contact with the environment at the end of the device where the jet is produced. Such an electrode arrangement allows for great safety while also producing a stable plasma column and jet during treatment inside the patient's body. Despite the small inner diameter and the low gas flow rate, the generated plasma jets are shown to be stable and sufficiently effective at treating cells or germs. The exceptional flexibility and length of the micro-plasma device will enable it to reach diverse areas inside the human body. Plasma devices analogous to the one created have enormous potential for the treatment of a myriad of internal human ailments due to the devices' great flexibility and favorable chemical, medical, and physical properties.

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