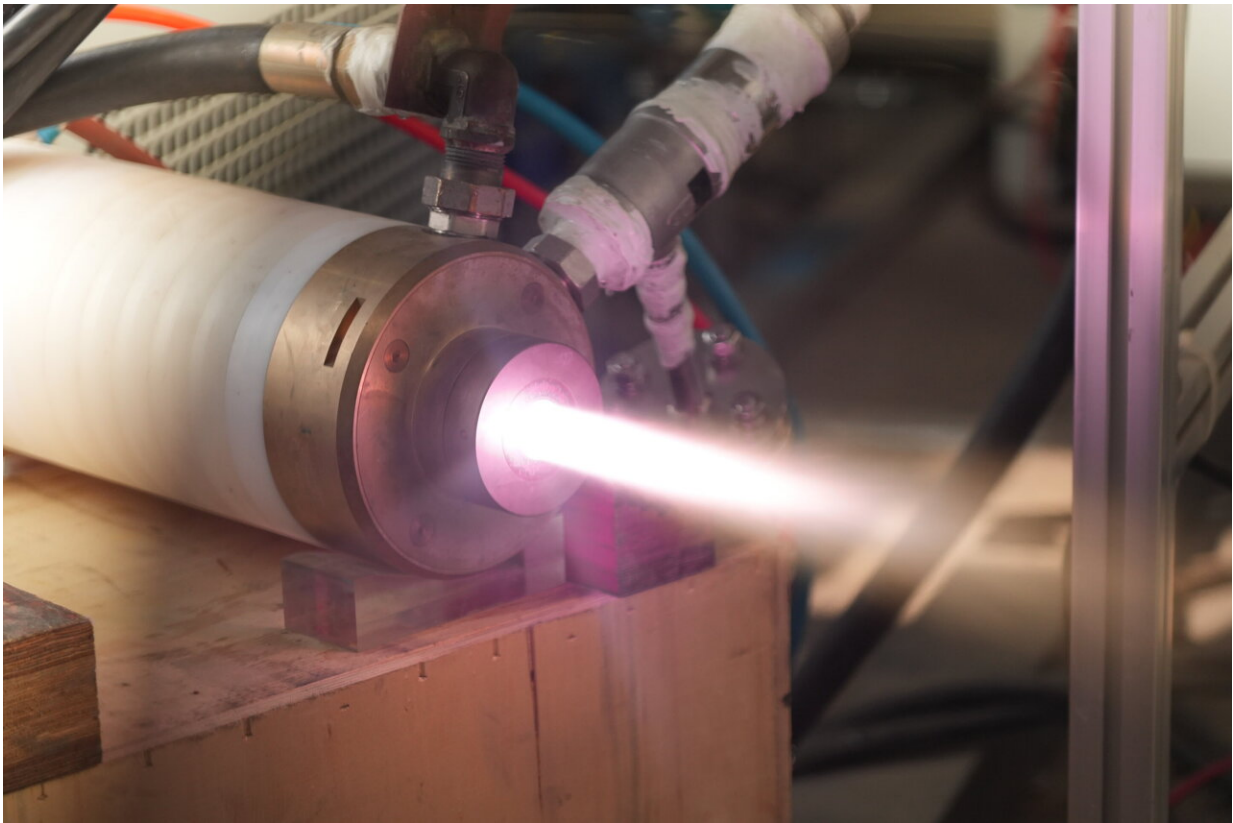


New design prolongs the lifespan of plasma torches

March 20 2024, by Zhao Weiwei



The plasma flame lasts for more than 160 hours. Credit: weiwei zhao

Thanks to a new design contributed by a research team led by Prof. Zhao Peng from Hefei Institutes of Physical Science (HFIPS) of Chinese Academy of Sciences (CAS), the operation time for plasma torch gas

been extended from several days to several years.

"We made the world's longest-lasting plasma torch," said Prof. Zhao.

Plasma torches, devices that generate thermal plasma, are pivotal in various industries due to their ability to efficiently produce high-temperature plasma. It can be applied in many fields including low-carbon metallurgy, powder spheroidization, carbon material preparation, and advanced material spraying.

However, their limited lifespan hindered large-scale application. The conventional fixed cathodes necessitate replacement upon depletion, resulting in short lifespans and high maintenance costs.

In this study, researchers developed a continuous-feed cathode system, which allowed for quick supplement of cathode that have been worn down. This operation eliminates the limitation of lifespan, offering nearly limitless operational longevity of the plasma flame.

"The design overcomes five major hurdles," said Senior Engineer Li Jun, who has been overseeing this experiment for 160 hours. "That includes [electrical conductivity](#), [thermal conductivity](#), sealing, [water cooling](#), and continuous propulsion mechanism."

"As for conventional plasma flame, 160 hours marks the end, but here it's just the beginning," he added.

This significant advancement propels the industrialization of [plasma](#) applications, ushering in a new era of efficiency and sustainability, say the researchers.

Provided by Hefei Institutes of Physical Science, Chinese Academy of

Sciences

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