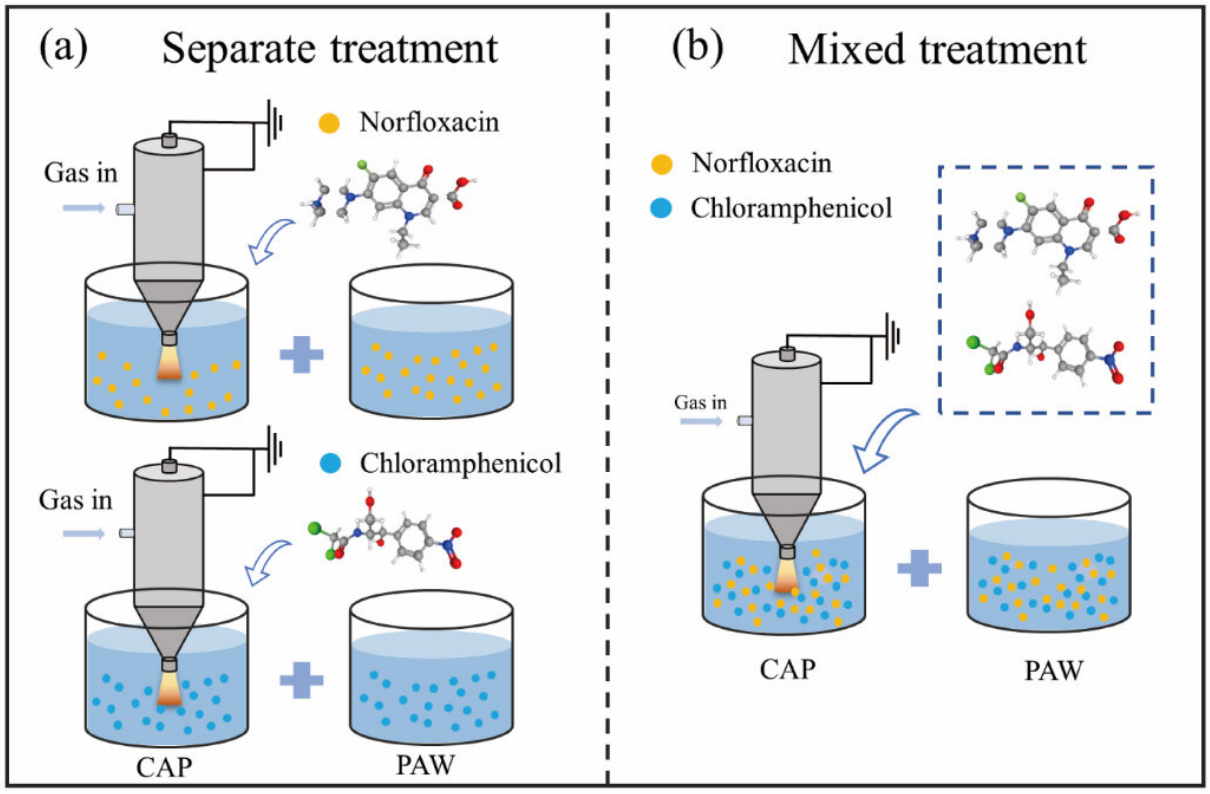
Low-temperature plasma technology shows promise in treating antibiotics in wastewater

May 8 2023, by Zhang Nannan



Schematic diagram of the experimental set-ups for treatment of norfloxacin/chloramphenicol in water. Credit: Fang Cao

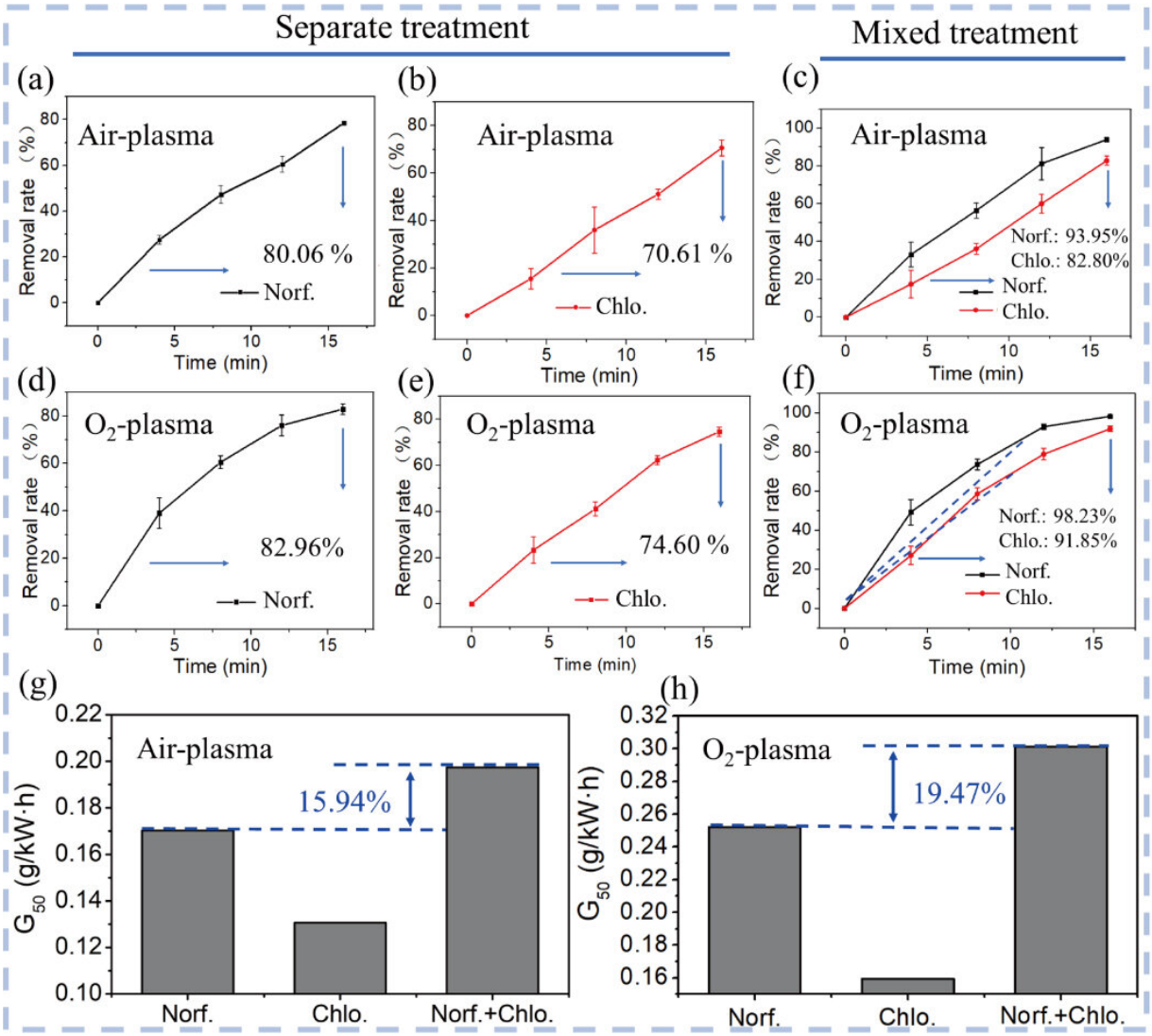
A research team led by Prof. Huang Qing from the Hefei Institutes of Physical Science of the Chinese Academy of Sciences proposed a novel

approach to treat antibiotics by using low-temperature plasma technology. The study was published in the *Journal of Hazardous Materials*.

Advances in medicine have led to an increase in the production and use of antibiotics. Treatment of antibiotics in wastewater has become an urgent practical problem that requires immediate attention. The development of effective methods to remove antibiotics from wastewater is crucial to protect both the environment and human health.

In this study, the researchers treated antibiotic mixtures using cold atmospheric plasma jet (CAPJ) in combination with plasma-activated water.

Using this method, the efficiency of treating mixed antibiotics was found to be higher than that of treating single antibiotics under appropriate conditions. For example, when plasma was used to decompose chloramphenicol, active chlorine was produced, which increased the treatment efficiency of norfloxacin.



Removal of norfloxacin/chloramphenicol by CAPJ with different working gases. Credit: Fang Cao

Further research confirmed the significant role of ·OH and $^1O_2$ in the degradation of norfloxacin and chloramphenicol by studying the effects of plasma-generated reactive oxygen/nitrogen species. The researchers also investigated the potential side effects of plasma-treated antibiotics treated and found that the resulting degradation products were

environmentally safe.

Prof. Huang's group has been working on the development of plasma technology and its application to the treatment of antibiotics in the environment for years. This study further provides a solid basis for the implementation of plasma technology in the treatment of wastewater contaminated with various antibiotics, which offers a promising solution to the problem of tackling antibiotic pollution in the environment.

More information: Cao Fang et al, Simultaneous removal of norfloxacin and chloramphenicol using cold atmospheric plasma jet (CAPJ): Enhanced performance, synergistic effect, plasma-activated water (PAW) contribution, mechanism and toxicity evaluation, *Journal of Hazardous Materials* (2023). DOI: 10.1016/j.jhazmat.2023.131306

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