Plasma degradation of water contaminants – focus on antibiotics

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The intensive use of antibiotics together with the limited efficiency of conventional water treatment techniques to remove these chemicals has led to increasing contamination of water bodies. Besides the negative effects of antibiotics on aquatic species [1], an even greater threat is their role in promoting antimicrobial resistance [2, 3].

Among the advanced oxidation processes (AOPs) extensively investigated for the degradation of various chemical compounds, including antibiotics, non-thermal plasma is undoubtedly a promising technique, which have shown positive results [4-7]. An important advantage of plasma treatment is the in-situ generation of the reactive species responsible for contaminants' degradation, without the need for external addition of oxidizers.

Recent progress on the use of non-thermal plasma for the degradation of antibiotics will be discussed, focusing on the influence of reactor configuration and experimental parameters on the removal rate, energy efficiency and mineralization rate of the target compounds.

The degradation pathways will be addressed for some of the main antibiotic classes, i.e. β-lactams, tetracyclines, sulfonamides and fluoroquinolones, as well as the role of the key reactive species generated in plasma.

The main challenges related to the plasma treatment of water, will be discussed, including scientific knowledge gaps and applicative challenges.

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