Bringing measuring accuracy to radical treatment

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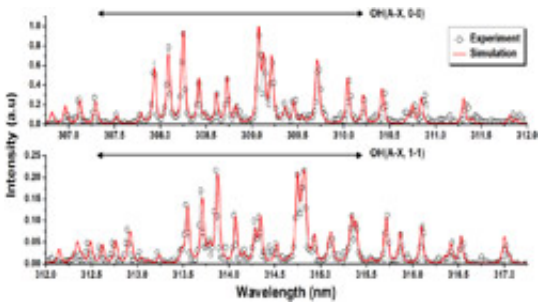

An international team of scientists working at the Plasma Technology research unit at Ghent University, Belgium, has determined for the first time the absolute density of active substances called radicals found in a state of matter known as plasma, in a study about to be published in *European Physical Journal D*. These findings could have important implications for medicine—for example, for stimulating tissue regeneration, or to induce a targeted antiseptic effect in vivo without affecting neighbouring tissues.

Qing Xiong and colleagues utilised laser fluorescence spectroscopy (LIF), a detection method used to estimate the density of radicals in plasma. Plasma is made of charged species, active molecules such as radicals and atoms.

The authors chose to focus on OH radicals because they are one of the most important reactive species in plasma science due to their high level of oxidation. This means that chemical reactions with OH initiate the destruction of harmful components either in the human body or in nature such as carbon monoxide, volatile organic compounds and methane.

The problem is that, up to now, laser-induced fluorescent capability to measure the absolute density of radicals has been very limited because of issues with registering and analysing the fluorescence signal.

In this study, the authors present a simplified model which takes into account energy transfer stemming from the radicals' vibrations. It can be used to analyse the LIF signal at regular atmospheric pressure. They then confirm the validity of their model experimentally, with a plasma jet made of Argon gas mixed with water molecules.

The calculation of one-dimensional line-averaged OH density made in this paper could also be extended to a two-dimensional spatial resolution of the OH radicals in future work.

More information: Q. Xiong, A. Nikiforov, L. Li2, N. Britun, R. Snyders, X. P. Lu, C. Leys, Absolute OH density determination by laser induced fluorescence spectroscopy in an atmospheric pressure RF plasma jet, *European Physical Journal D*, DOI: 10.1140/epjd/e2012-30474-8

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