Chemical probe calibration for reactive oxygen radicals with hydrogen peroxide and low energy X-ray

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Non-equilibriumatmospheric pressure plasma irradiated onto water can generatechemically active species such as a hydroxyl radical inside water andhas been used for plasma sterilization or environmentalapplication.Such radicals behavior in water can be visualized withchemical probe such as Iodine Potassium(KI)-starch. We proposed alsoKI-polyvinyl-alcohol(PVA) as a new chemical probe. In order tocalibrate oxidization power of reactive radicals in plasma irradiatedwater, in this work, we used hydrogen peroxide concentration or lowenergy X-ray dose as the measure of oxidization power. Absorbance of the solution with KI-starch and hydrogen peroxide mixed was measuredas the function of the hydrogen peroxide concentration andcalibration curve was obtained. By using this curve, we can deducehow much \"equivalent concentration\" does plasma irradiatedwater has, ,compare the performance of different plasma sourceability, and optimize the operating condition to achieve the mosteconomical plasma application. Recently, we found small vacuumdischarge tube (so-called Crook\'s tube) has ability to emit highintensity X-ray. X-ray has also oxidization power and Its power canbe confirm with the same chemical probe. So by comparing plasma andX-ray effect, we can assign the \"equivalent dose\" forplasma irradiation. Preliminary results for these attempt will beshown at the conference.

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