

可塑チューブ内の活性酸素ラジカル研究へのPVA-KI化学プローブの応用

Application of PVA-KI chemical probe to ROS research in the flexible tubes

○ 松浦 寛人^{1,2}, オウアンサビンサ ブニャン², トラン グエン トラン², 胡 敏², 朝田 良子^{1,2}

(1. 大府大放射線, 2. 大府大工)

○ H.Matsuura^{1,2}, B.Ouanthavinsak², T.N.Tran², Hu Min², R.Asada^{1,2}

(1.Rad. Res. Center, Osaka Pref. Univ., 2.Grad. School Eng., Osaka Pref. Univ.)

E-mail: matsu@me.osakafu-u.ac.jp

Introduction: Escherichia coli samples set inside a long flexible tube was found to be inactivated by atmospheric plasma jet treatment, not only at plasma flame contacting point, but also at the tube exit [1]. According to this research, roll of reactive oxygen radical(ROS) was confirmed biologically, although direct radical detection has been difficult. Polyvinyl Alcohol (PVA) - Potassium Iodine (KI) reaction was recently proposed to use as chemical dosimeter of proton beam or X-ray [2]. We introduced this chemical sample to study ROS and the first preliminary result was already reported [3]. In this work, importance of sample and irradiation condition is reported. By considering it, ROS research in the flexible tube has been improved.

Experiments and results : PVA-KI sample composition procedure and its reaction with ROS were reported long time ago [4]. If iodine ion is oxidized by ROS, it is captured by PVA molecules and show clear color change. During the basic research with PVA-KI, there were so many options in the sample composition and plasma irradiation configuration. So before using PVA-KI as quantitative probe, these condition must be checked carefully and results reproductivity must be confirmed.

Recently, we found storage condition of PVA-KI sample was an important factor of this measurement reproductivity. As shown in the right figure, color change of PVA-KI sample is different with the storage time after its composition. New sample shows the same color as in the radiation dose measurement literatures [2]. Old sample must be stored in the refrigerator. Otherwise, old sample shows different color change from the radiation dose measurement literatures.

The new high sensitive gal type sample is prepared to study ROS distribution in the flexible tube. In this work, we confirm radical transport along the tube inner wall. Some of these results will be discussed at the meeting site. This work was supported by the ZE Research Program, IAE (ZE2020B-09), and the joint usage / research program, cLPS(20024).

references : [1] T.Fujiyama, et al., APSPT-9/SPSM-28, P1-39 (2015). [2] 砂川武義他. 福井工業大学研究紀要 47, (2017), 105-110. [3] H. Matsuura et al., ICRP34/ICRP10, PO16PM-029(2019). [4] 林貞男他, 高分子化学 20, 303-311(1963).

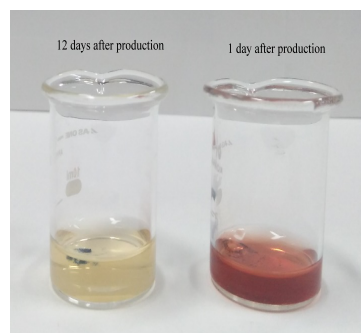


図 1: Effect of sample storage condition. Two PVA-KI liquid samples irradiated with He plasma jet(2 min.). left: the sample was stored 12 days after composition. right: the sample was irradiated just one day after composition.