EPR detection method of Irradiated Wheat Flour

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EPR detection method of irradiated foods is now a growing field of research. We revealed free radicals in wheat flour before and after _-ray irradiation and their thermal behavior during heat treatment using EPR. The EPR spectrum (Fig.1) of wheat flour before irradiation consists of a sextet centered at g = 2.0 and a singlet signal at the same g-value position. The first one is attributable to a signal with hyperfine (hf) interactions of Mn^{2+} ion (hf constant: 7.4 mT). The second is originated from carbon-centered radical. Upon _-ray irradiation, however, a new signal with two triplet lines at the low and high field ends was detected in wheat flour on top of the Mn^{2+} sextet lines. We analyzed the triplet EPR lines as powder spectra (rhombic g-tensor symmetry) with nitrogen (^{14}N) hyperfine interactions. This indicates that a new organic radical was induced in the conjugated protein portion of wheat flour by the _-ray irradiation. Intensity of the organic free radical at g = 2.0 detected in irradiated wheat flour increased monotonically by a thermal treatment. The analysis of the time-dependent evolution process based on the theory of transient phenomena as well as the nonlinear least squares numerical method [1-2] provided a unique time constant for the radical evolution in wheat flour during the thermal treatment.

[1] M. Ukai et all, Appl. Magn. Reson.**25**, 95-103 (2003)
[2] M. Ukai M et all, J. Food Science **68**, 2225-2229 (2003)

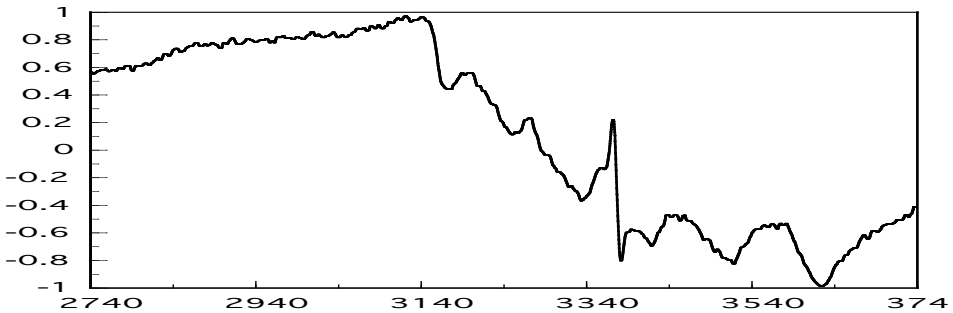

Fig. 1 The EPR signal of wheat flour.