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ESR study on thermal metamorphism of kerogen in sedimentary rocks from Oga Peninsula.

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Thermal metamorphism of organic components in geological samples is irreversible and applied to a geo-thermometer. Vitrinite reflectance, Raman and IR spectroscopy have been used for this purpose. Carbon radicals in a carbonaceous sample, which are produced under thermal cracking process, have a potential to be another unique geological thermometer. Until present, many studies on carbon radicals were accumulated for various coal and oil samples including their pyrolysis experiments.

It is known that carbon radicals in kerogen show a broad spectrum at g = 2 by electron spin resonance (ESR) spectroscopy. Bakr et al (1990) reported that the linewidth of ESR spectrum of extracted kerogen decreased as the increase of burial depth[1)]. However, such narrowing of ESR spectrum was not observed in laboratory pyrolysis experiments[2−3)]. We have performed annealing experiments at higher temperature up to 600^{o}C for kerogen extracted from organic-containing sedimentary rocks from Oga Peninsula, such as asphaltum, mudstone and shale. As a result, narrowing of ESR spectrum about one-fourth of original was firstly observed for a sample heated at 600^{o}C for 210min.

1) M. Y. Bakr, et al., Org. Geochem. **15**. (1990) 595-599.
2) A. Uesugi and M. Ikeya, Jpn. J. Appl. Phys. **40**. (2001) 2251-2254.
3) N. Qiu, et al., Energy Exploration & Exploitation **30**. (2012) 311-330.

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