

Sample preparation ③

Product used : Electron Spin Resonance (ESR)

■ Sampling of gas sample

For gas samples with low dielectric loss, the shape of the sample tube can be chosen freely, provided that the sample concentration is sufficient for ESR measurement. However, when the sample has high concentrations, the fine structure may disappear, leading to an increased ESR signal line width. ESR measurement of active oxygen radicals can be challenging due to their short lifetime. As a result, they are typically measured indirectly using the spin trap method in the liquid-phase. For more details on the spin trap method, please refer to application notes ER070002E.

■ ESR measurement example of a gas sample - Oxygen

The detection part (the cavity) of the ESR instrument is hollow, and oxygen is always present. Since oxygen is a radical, its ESR signal will be observed, as indicated by the blue line in Figure 1, when ESR is measured under this condition. The ESR signal of oxygen does not significantly affect the ESR signals of organic radicals because the ESR signals of organic radicals are usually observed in the red frame range. However, when ESR signals from metal ions are observed across a wide magnetic field range, it might be desired to remove the oxygen signal. In such cases, the ESR signal of oxygen can be eliminated by filling the cavity with nitrogen gas from a nitrogen gas nozzle, allowing for measurements without the interference of the ESR signal of oxygen (as shown by the black line in Figure 1).

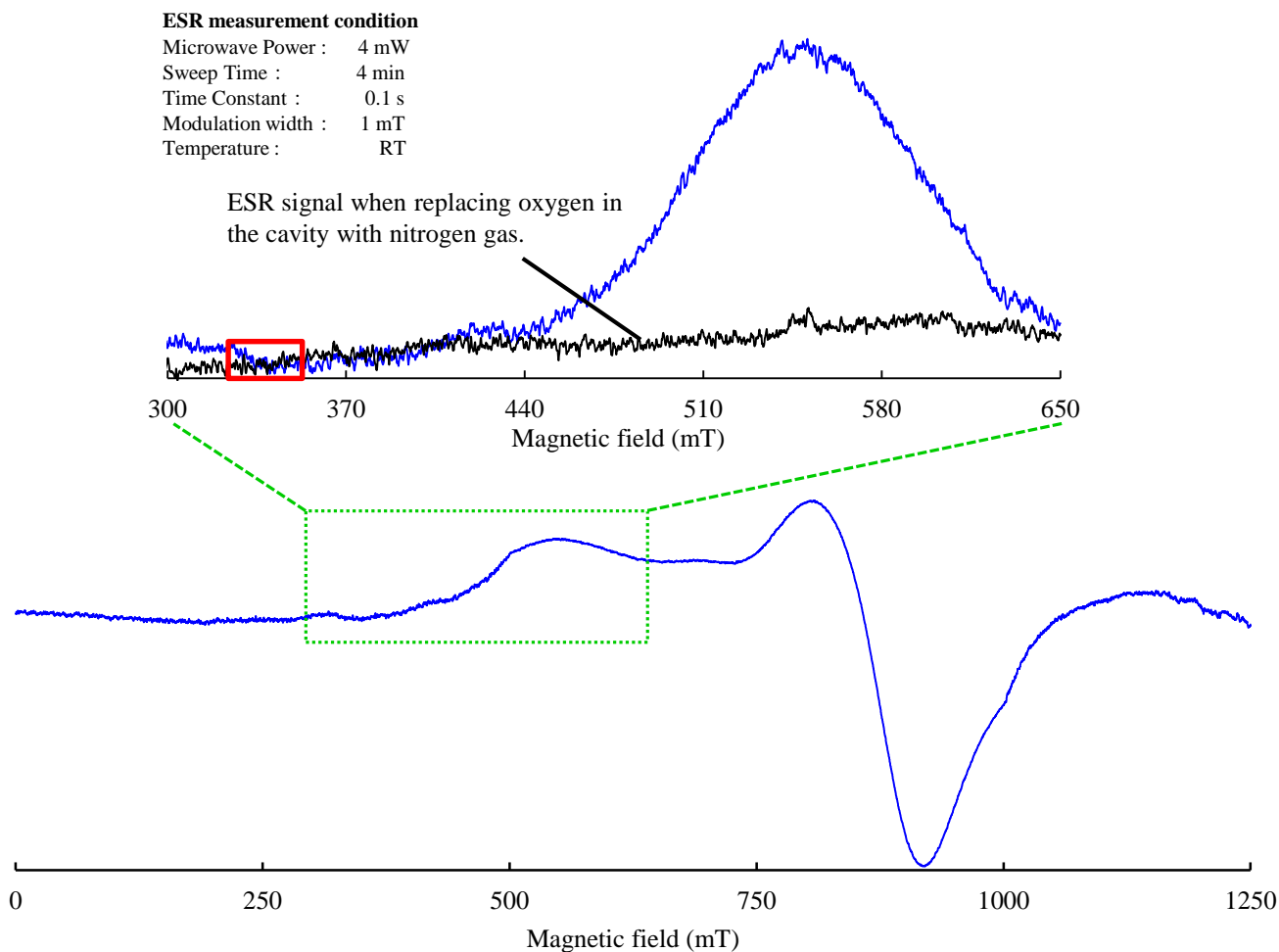


Figure 1. ESR signal of oxygen

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