

ESR measurement condition ****Sweep time and time constant****

Product used : Electron Spin Resonance (ESR)

■ Relationship between sweep time and time constant

A balance is important in setting the sweep time and the time constant, and selecting an inappropriate combination may result in a decrease in resolution or a decrease in sensitivity. Figure 1 shows the results of measuring perylene with a fixed sweep time of 8 min and varying time constants. With a short time constant, even fine signals can be observed, but at the same time, they are strongly affected by noise. With a long time constant, it will not be able to follow changes in the signal and a broad signal will be detected. A longer time constant is better for S/N, and a smaller one is better for signal responsiveness. The optimum time constant for recording ESR signal can be estimated by using Equation (1). In this case, the time constant τ is 0.075 s, so we can find that the measurement at 0.03 s satisfies this condition.

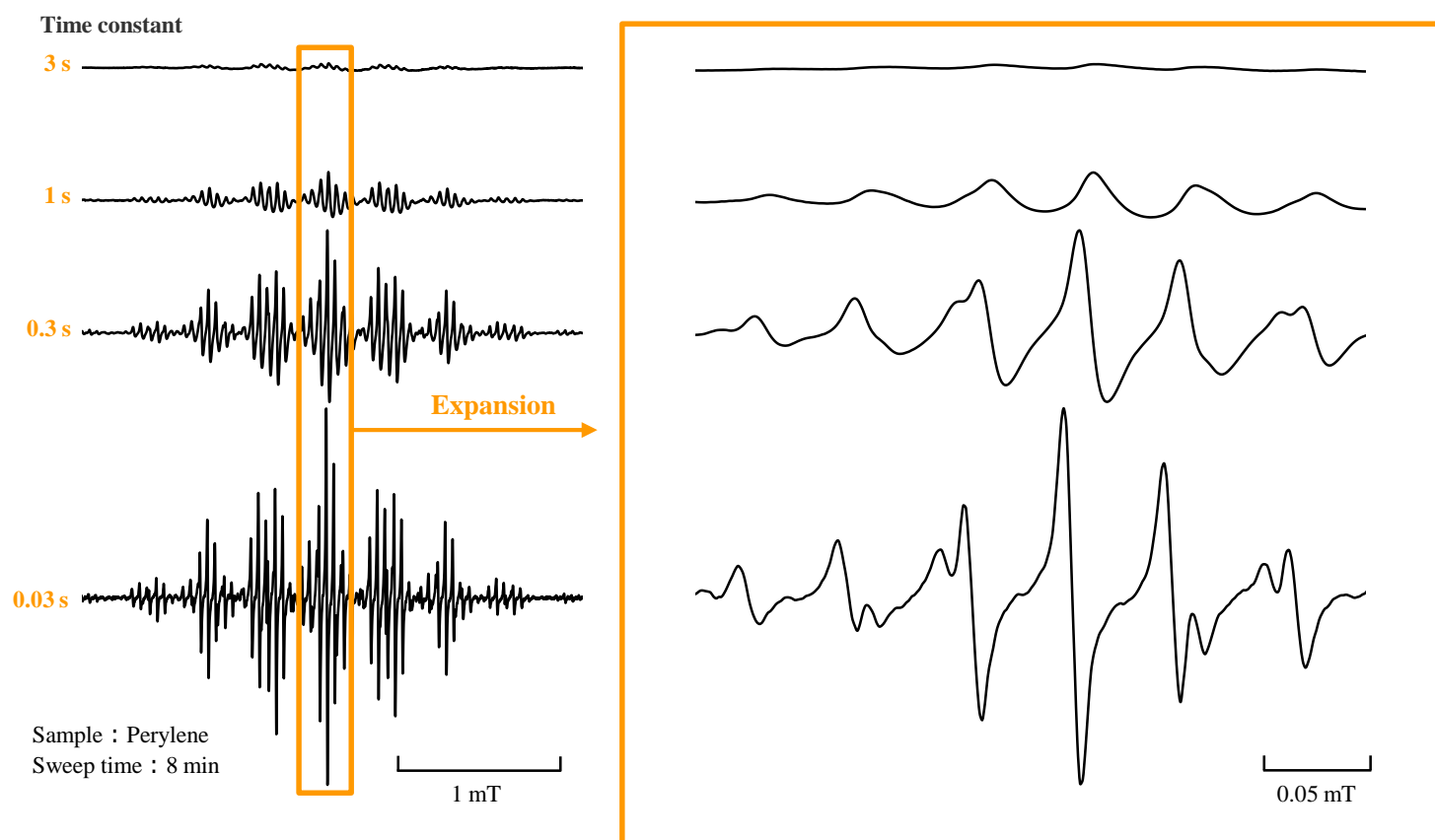


Figure 1. Change of the ESR signal with the time constant

**Calculation for estimating
the optimal time constant**

$$\tau < \frac{\Delta H_{pp}(\text{Line width})}{\Delta H_{swp}(\text{Sweep width})} \times \Delta t(\text{Sweep time}[s]) \times 0.1$$

Equation (1)

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