

## Introduction of Dual Mode Cavity (ES-14040DMC)

Product used : Electron Spin Resonance (ESR)

### ■ Dual Mode Cavity (ES-14040DMC)

The dual mode cavity (ES-14040DMC) is newly added to the lineup of ESR attachments (Figure 1). This cavity can detect ESR signals while applying microwave magnetic field ( $B_1$ ) from perpendicular or parallel direction against external magnetic field ( $B_0$ ). Since the spin transition probability changes depending on the  $B_1$  direction, this cavity can be used to observe not only allowed transitions but also forbidden transitions such as triplets ( $S = 1$ ), integer spin systems and transition metal ions, etc.

#### ■ Main specifications

- Magnetic field modulation : 10 kHz (external modulation)
- Magnetic field modulation width : 1 mT (max)

#### ◆ Perpendicular mode

- Resonating frequency : Approx. 9,600 MHz
- Resonance mode : Rectangular  $TE_{102}$
- Unloaded Q-value : > 10,000

#### ◆ Parallel mode

- Resonating frequency : Approx. 9,450 MHz
- Resonance mode : Rectangular  $TE_{012}$
- Unloaded Q-value : > 8,000



Figure 1. Dual Mode Cavity (ES-14040DMC)

### ■ Example of ESR measurement

Figure 2 shows ESR spectra of MnO ( $S = 5/2, I = 5/2$ ) at room temperature. As shown in Figure 2(A), 6 allowed transitions of  $Mn^{2+}$  are clearly observed in the perpendicular mode. On the other hand, figure 2(B) shows 5 lines (\*) with different intensity are mainly observed in the parallel mode, and 6 lines observed in the perpendicular mode are also appeared slightly. A new perspective to your sample might be obtained from ESR by using a dual mode cavity.

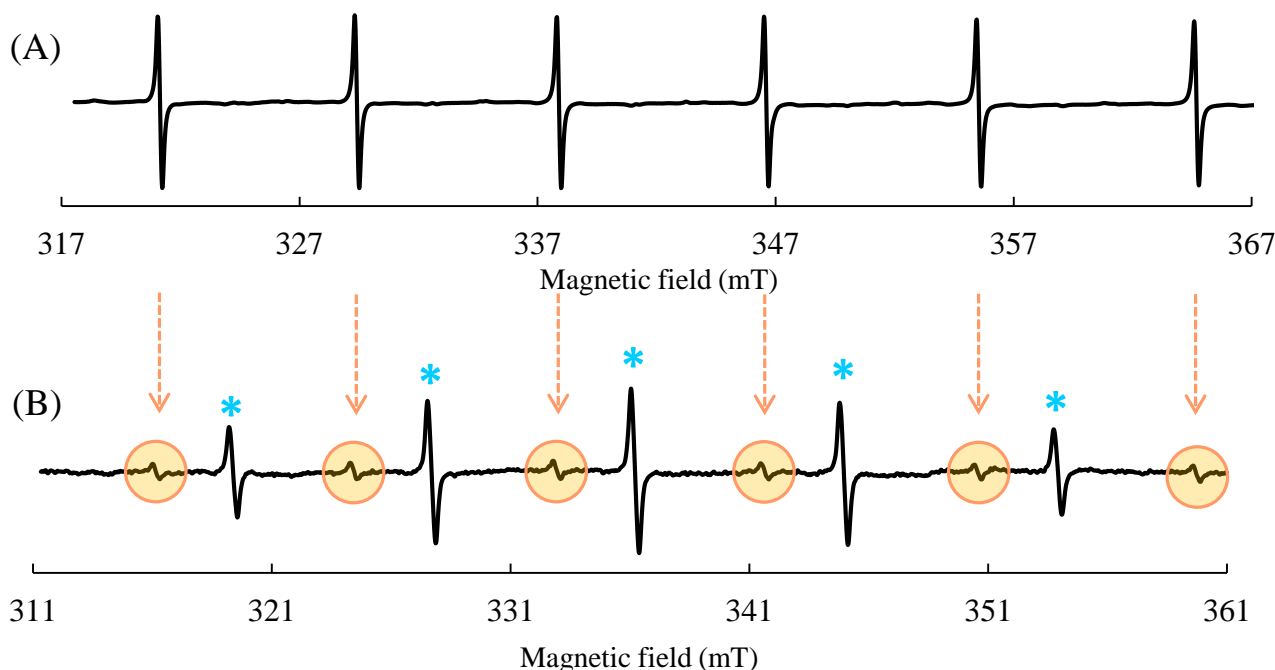


Figure 2. ESR spectra of MnO obtained by perpendicular and parallel mode  
 (A) Perpendicular mode (Frequency : 9593 MHz) (B) Parallel mode (Frequency : 9454 MHz)

Copyright © 2021 JEOL Ltd.

Certain products in this brochure are controlled under the "Foreign Exchange and Foreign Trade Law" of Japan in compliance with international security export control. JEOL Ltd. must provide the Japanese Government with "End-user's Statement of Assurance" and "End-use Certificate" in order to obtain the export license needed for export from Japan. If the product to be exported is in this category, the end user will be asked to fill in these certificate forms.

