

Q. Is it necessary to change an ATR prism according to the sample?

- A. The application range can be widened by properly selecting a prism depending on refractive index(RI) and analytical purpose. ATR prism can be selected from 3 types of prism available from JASCO

ATR method is an analysis method used to measure the sample surface of 1~2 μm in depth with the prism close in contact to the sample. In ATR method, the penetration depth of light into the sample and RI of sample for total reflection depends on RI of a prism and sample. In addition measurement range and the durability are different depending on the materials of the prism. Features of each prism are shown as follows.

- Features of each prism

Prism	RI(n_1)	Depth of penetration dp^{*1} (1000 cm^{-1})	RI of sample(n_2)*2 for total reflection	Measurement limit in low wavenumber*3 range
ZnSe	2.4	Approx. 2.0 μm	Below 1.7	~550 cm^{-1}
Diamond	2.4	Approx. 2.0 μm	Below 1.7	~400 cm^{-1} *4
Ge	4.0	Approx. 0.6 μm	Below 2.8	~650 cm^{-1}

Prism	Feature of prism	Suitable sample	Non-suitable sample	Points to be noted
ZnSe	Good throughput	General organic substance	Hard powder, acid-alkaline, high RI sample	In case of Hard powder or hubbly sample, diamond is recommended.
Diamond	Intensity, durability, Measurement range	Hard powder, General organic substance	high RI sample	Poor S/N ratio at around 2000 cm^{-1} due to its absorption around.
Ge	Analysis for high RI sample	Sample including carbon	Hard powder, acid-alkaline	Weak intensity in ordinate axis due to less depth of penetration

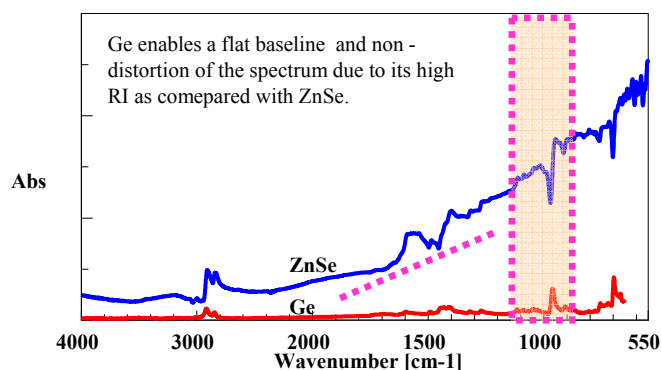
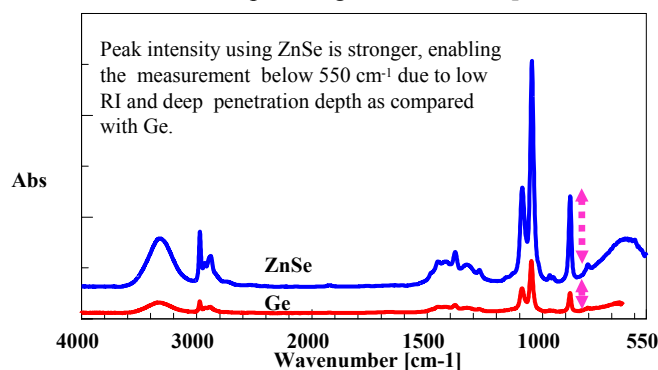
$$*1 \quad dp = \frac{\lambda}{2\pi n_1} \left[\sin^2 \theta - \left(\frac{n_2}{n_1} \right)^2 \right]^{-\frac{1}{2}} \quad *2 \quad \sin \theta \geq \frac{n_2}{n_1} \quad \text{angle of incidence : } \theta = 45^\circ$$

*3 Case of measurement using ATR PRO 450-S, standard FTIR.

*4 If the measurement is needed in the wavenumber range below 400 cm^{-1} , please contact local JASCO distributor.

- Measurement example using ZnSe and Ge prism

Suitable example using ZnSe Sample : ethanol



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