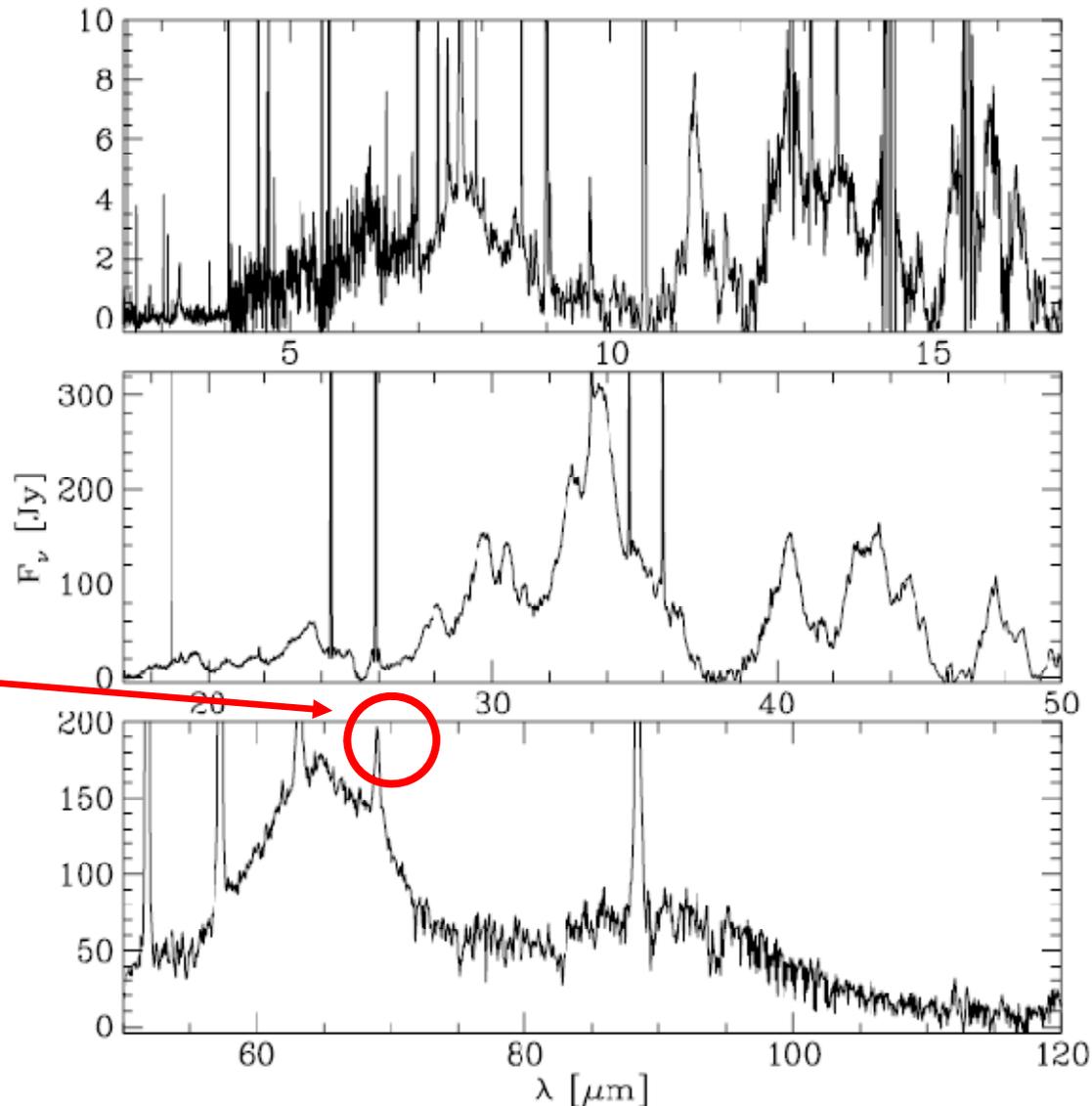


Forsterite 微粒子の形状・結晶性の 赤外吸収スペクトル —温度効果による変化

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Fo_69 μ m

Molster et al.
2001, A&A 372,
165

Fig. 2. The continuum-subtracted spectrum of NGC 6302 from 2.4 to 120 μ m. The region from 2.4 to 17 μ m (top panel) is characterized by the presence of C-rich dust features. At longer wavelengths, the spectrum becomes dominated by O-rich dust with the crystalline silicates bands in the 17 to 50 μ m region (middle panel) and broad structures of crystalline H₂O ice and probably hydrous silicates beyond 50 μ m (bottom panel).

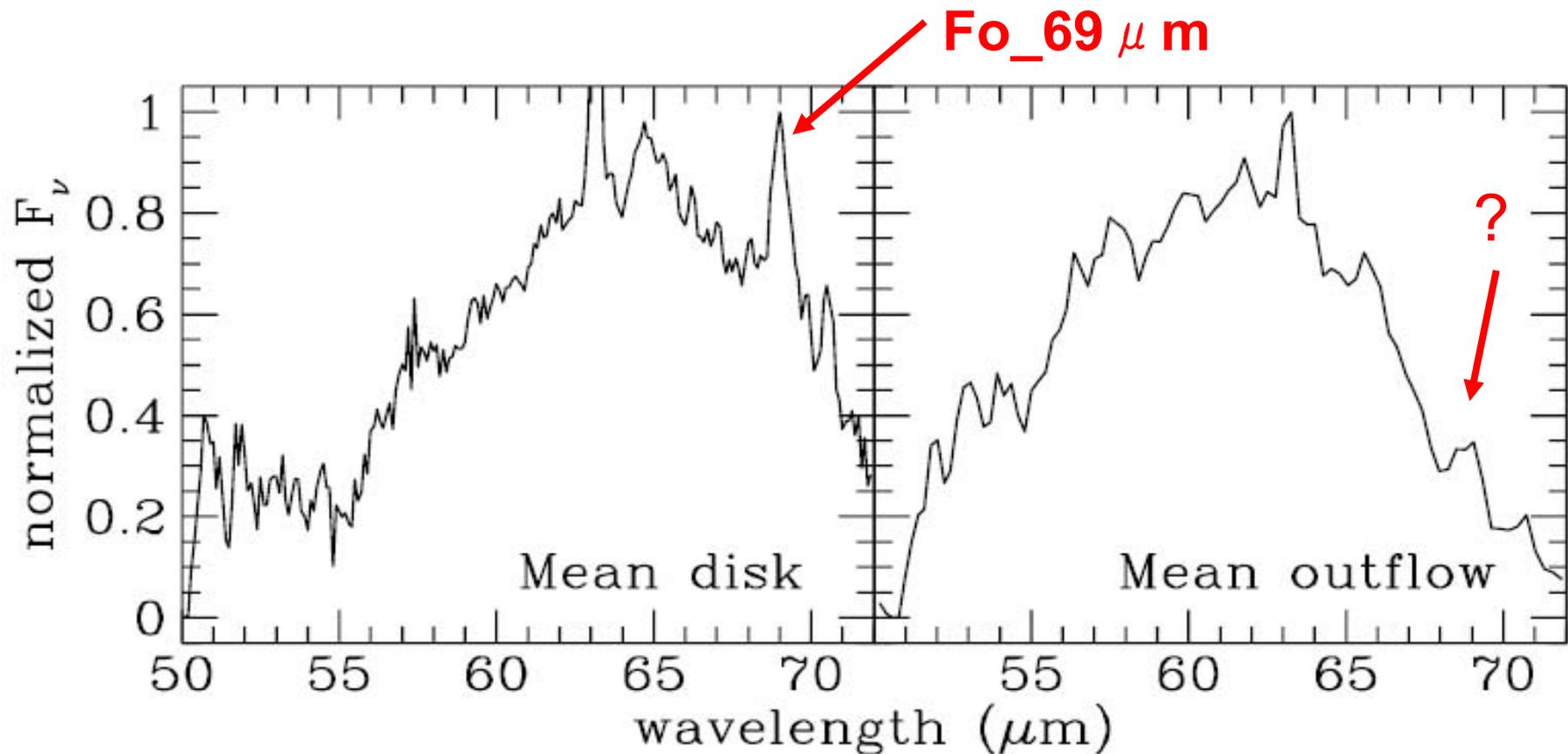


Fig. 7. The normalised mean 60 micron complex spectrum of the disk and outflow sources. The normalised mean spectrum for the disk sources is derived from NGC 6537, NGC 6302, MWC 922, HD 44179 and Roberts 22, the normalised mean spectrum for the outflow sources is derived from all outflow source spectra.

Forsterite 微粒子

アモルファスな粒子・結晶性の異なる粒子 形状の異なる粒子

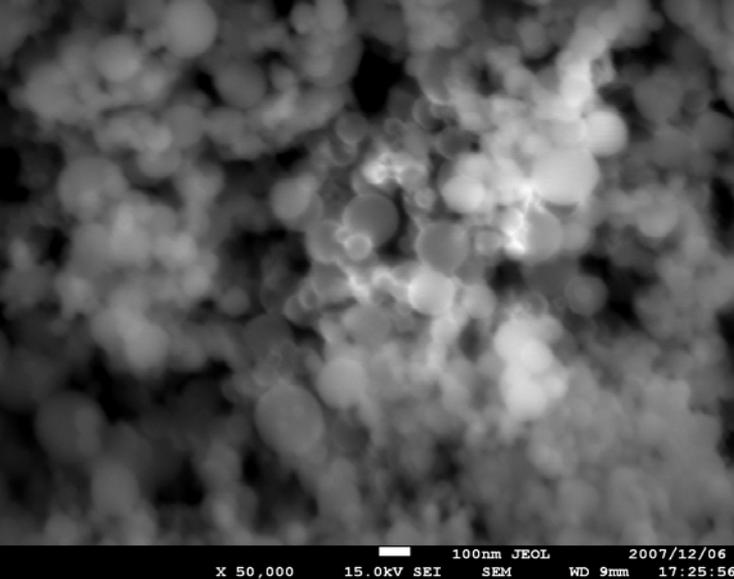
- 日清の粒子の加熱（球状）
- マルスサンプル（楕円形）
- 合成サンプル（カリフラワー状）
- バルクのサンプルを磨り潰す（不規則形状）

結晶性悪い・欠陥などの入った粒子

- ボールミルにより生成

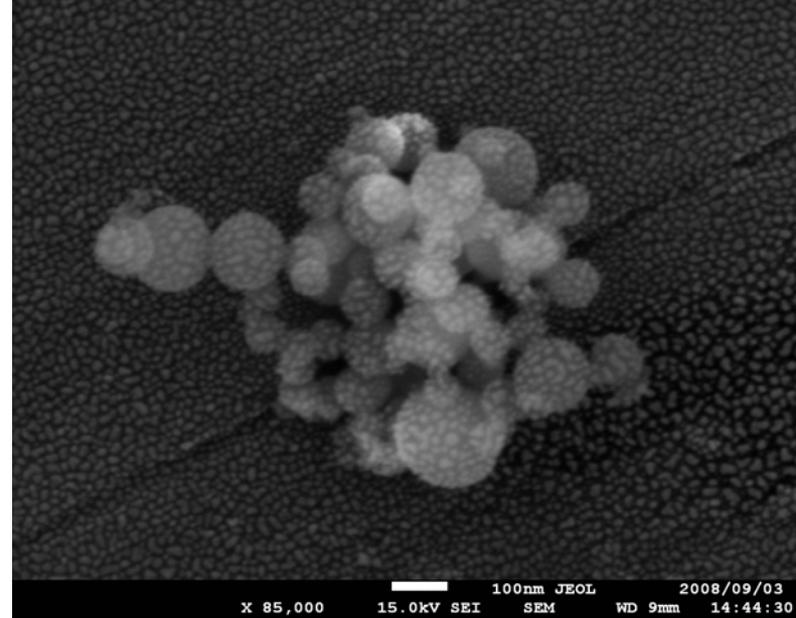
これらの効果によりピークがどのように変化するか
低温にしたときピークはどのように変化するか

特に **69ミクロン** に注目

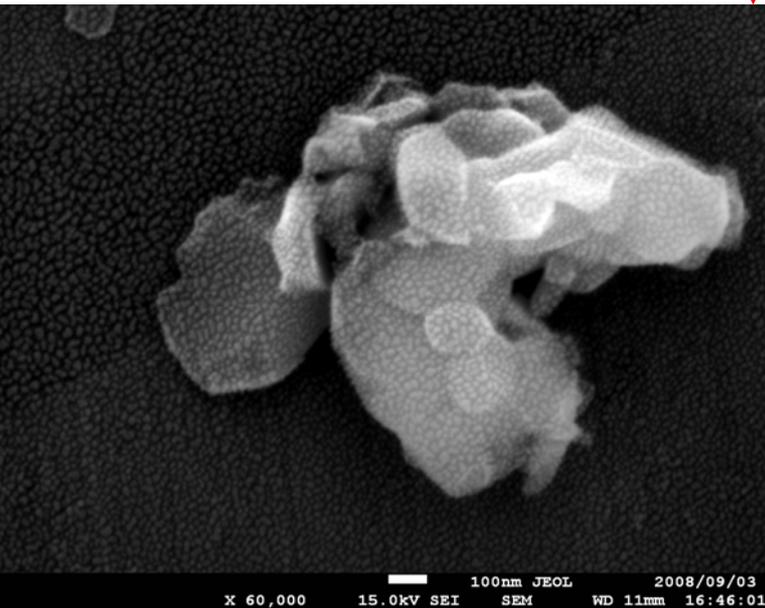


NiB Amorphous
average size
80 nm

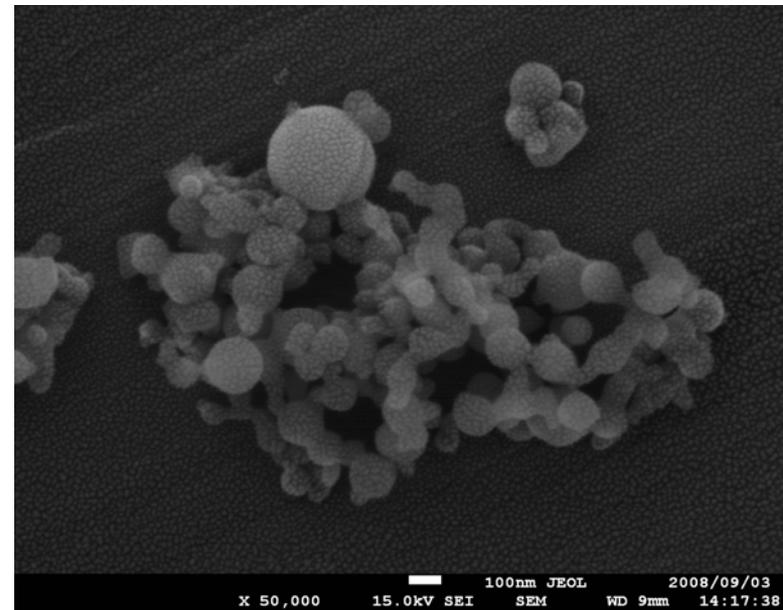
800°C 3hr



1200 °C 6hr



1130 °C 24hr

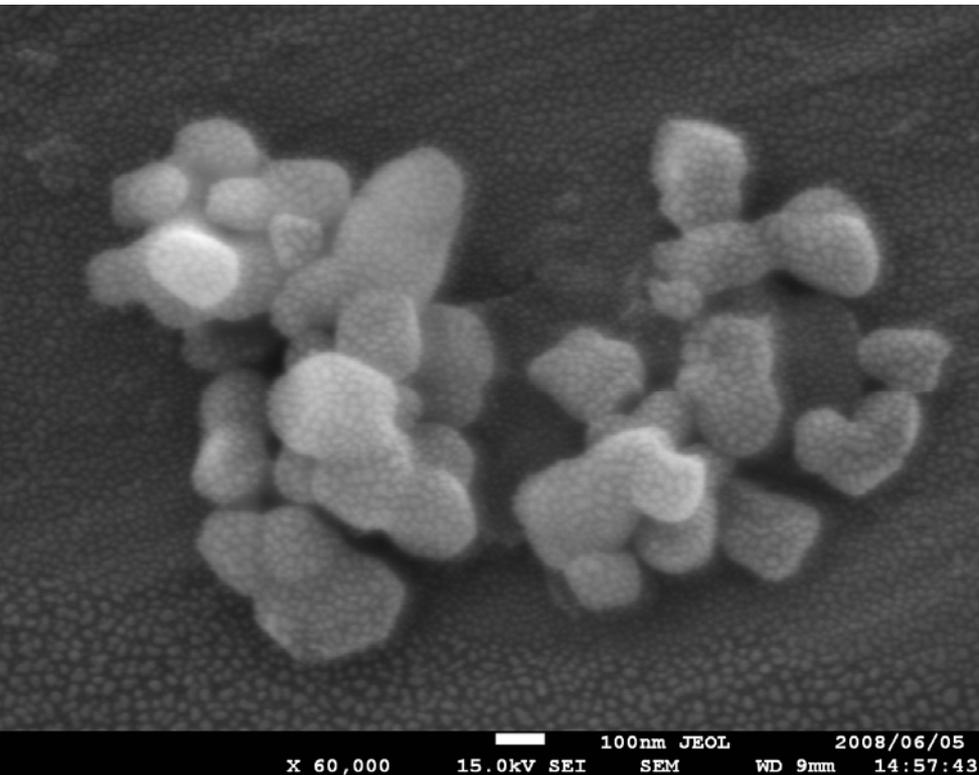


Shape changed as annealing at high temperature

Elliptical particles (marusu Ltd.)

synthesized after heating the mix powder of MgO and SiO₂ at 1175 °C 24hr

elliptical ~0.2 μm



100 nm

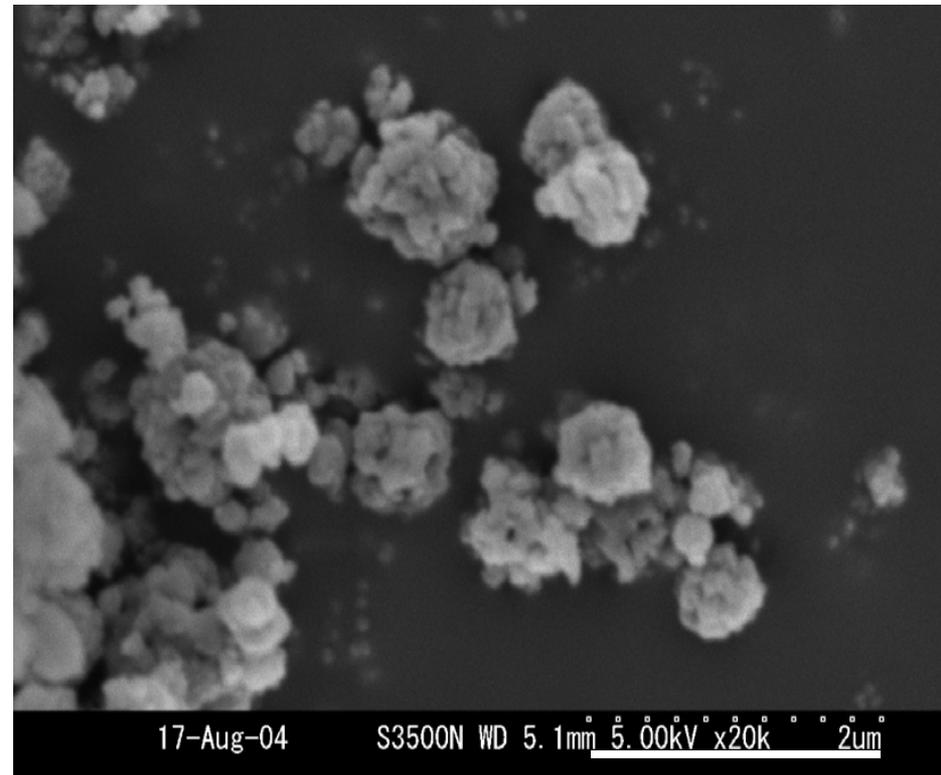
cauliflower

spray method by Suto

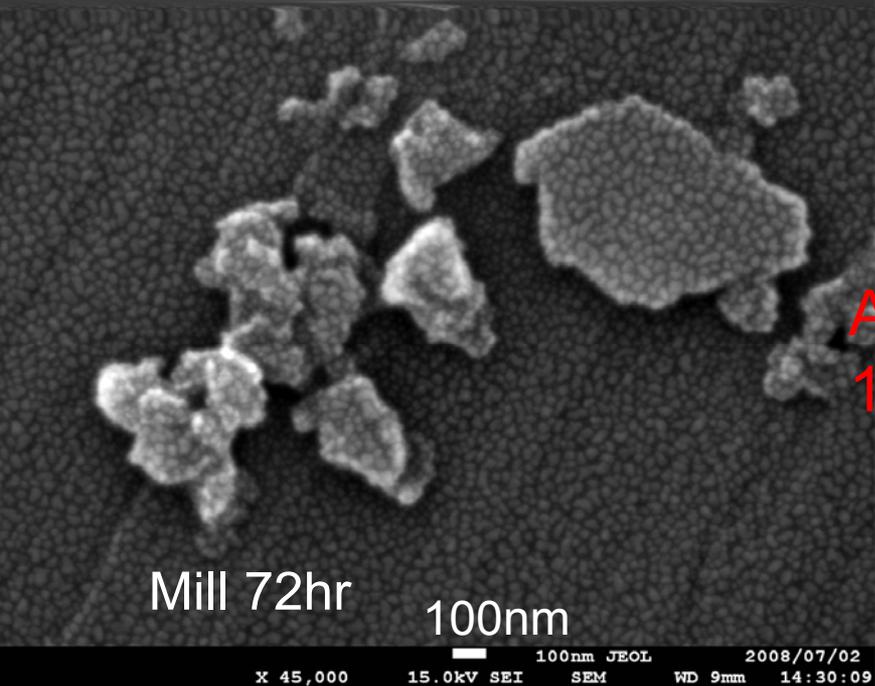
Mix Mg(NO₃)₂ 6H₂O & SiO₂ colloidal sol into furnaces of 200/400/600/1000 °C

cauliflower

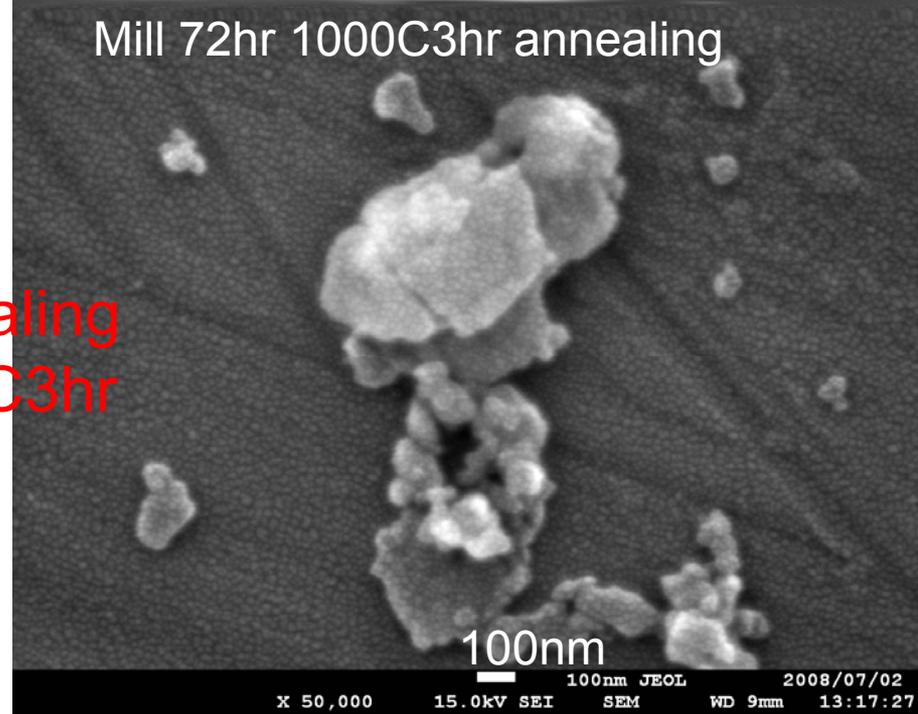
aggregate of 0.1-0.2 μm particles



2 μm



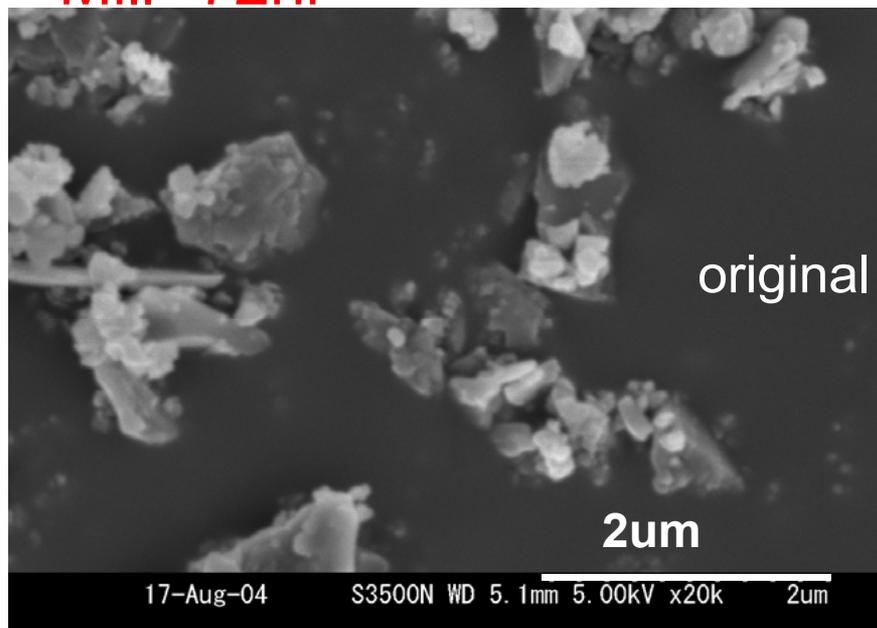
→
Annealing
1000C3hr



↑ Mill 72hr

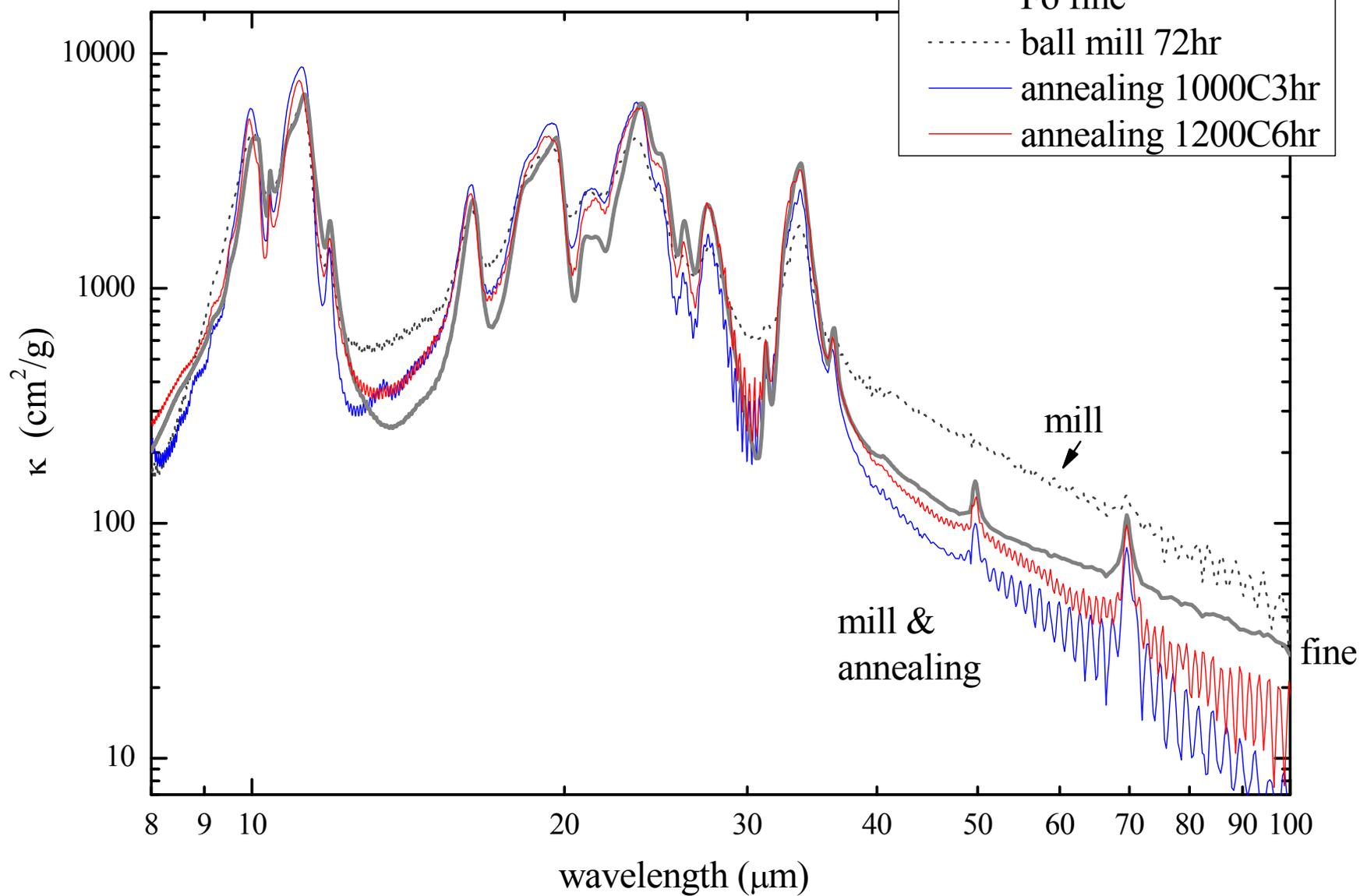
Fo fine particles
from bulk sample

Fo-fine

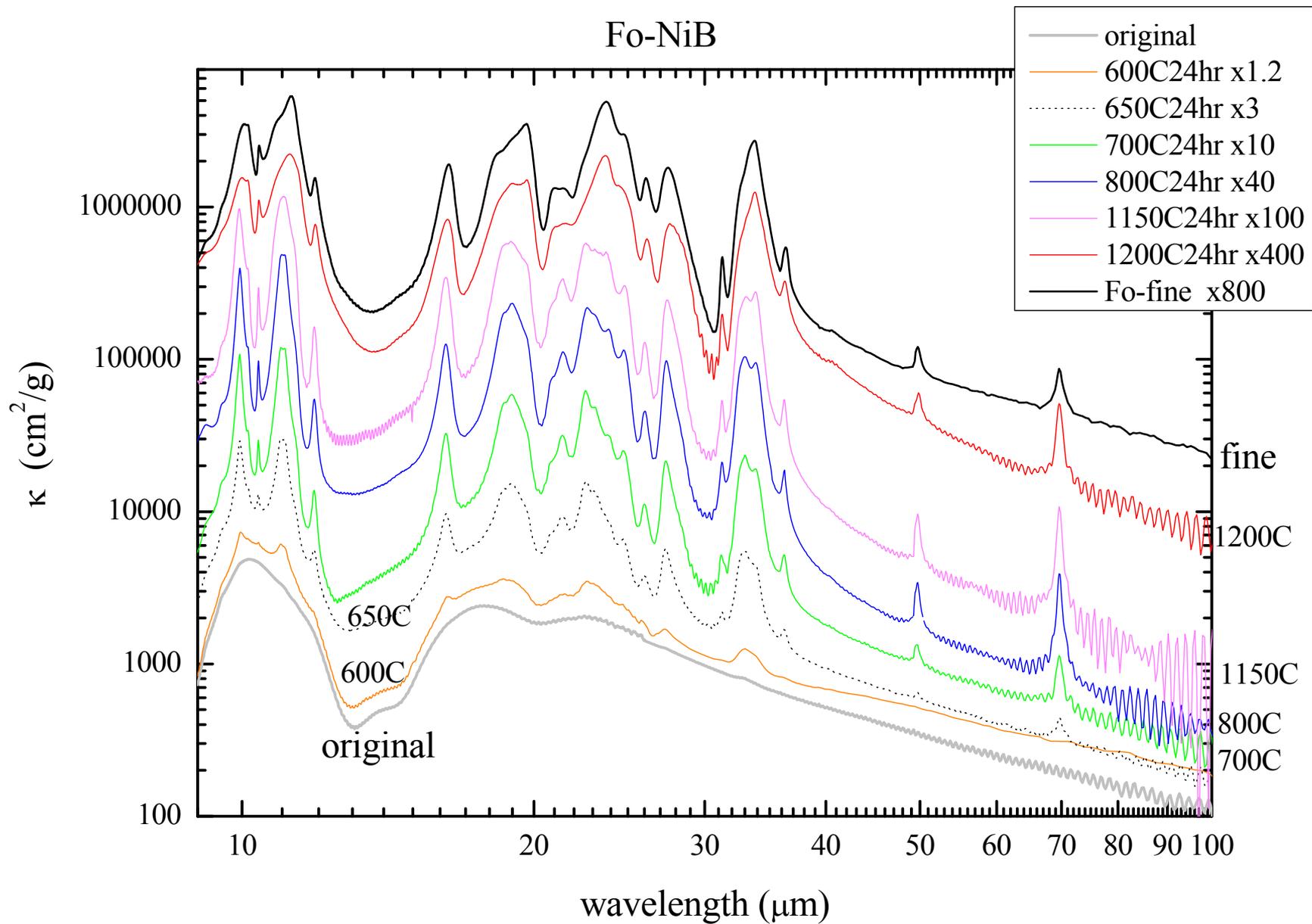


original

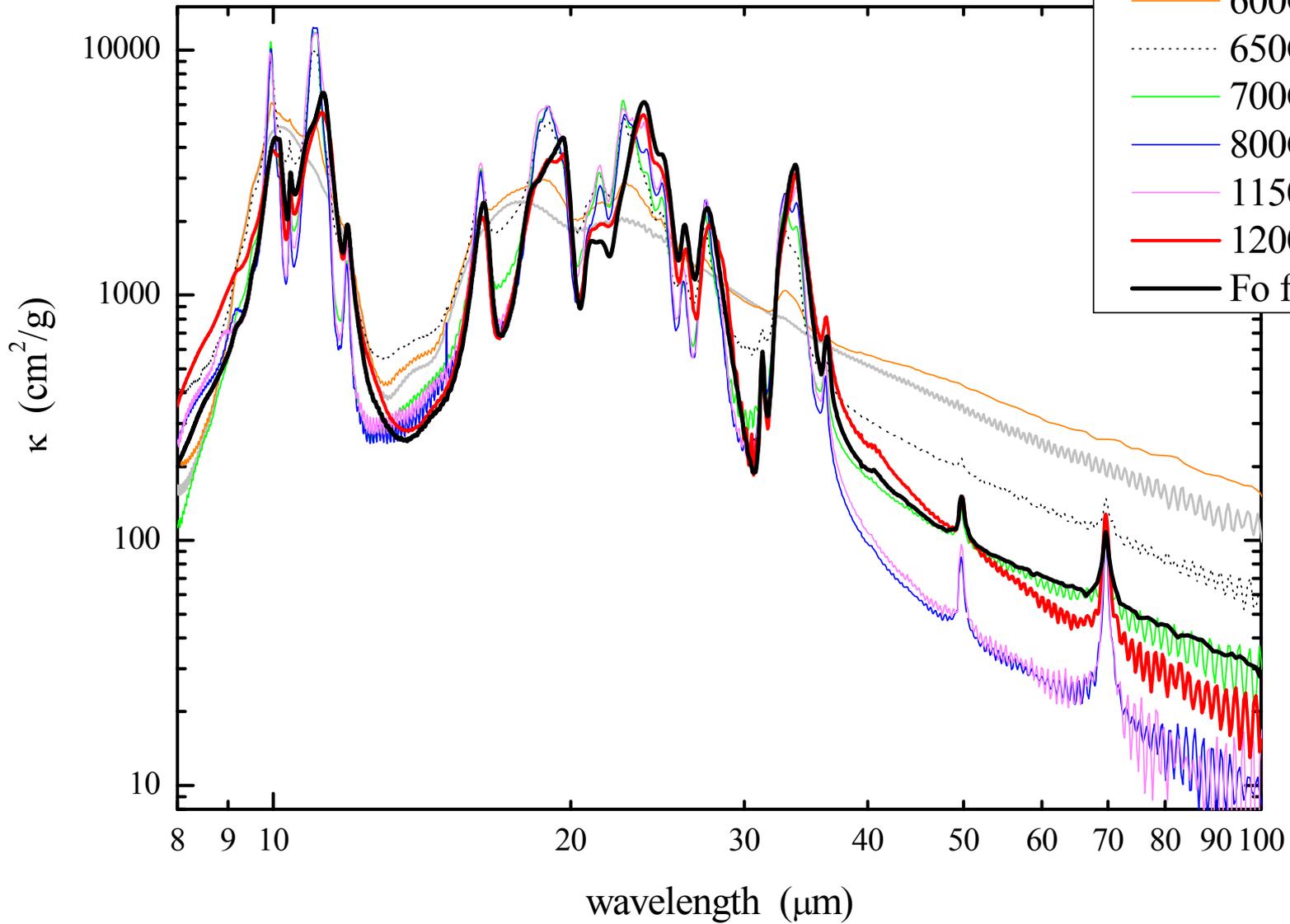
Fo fine particles from Bulk



Fo-NiB

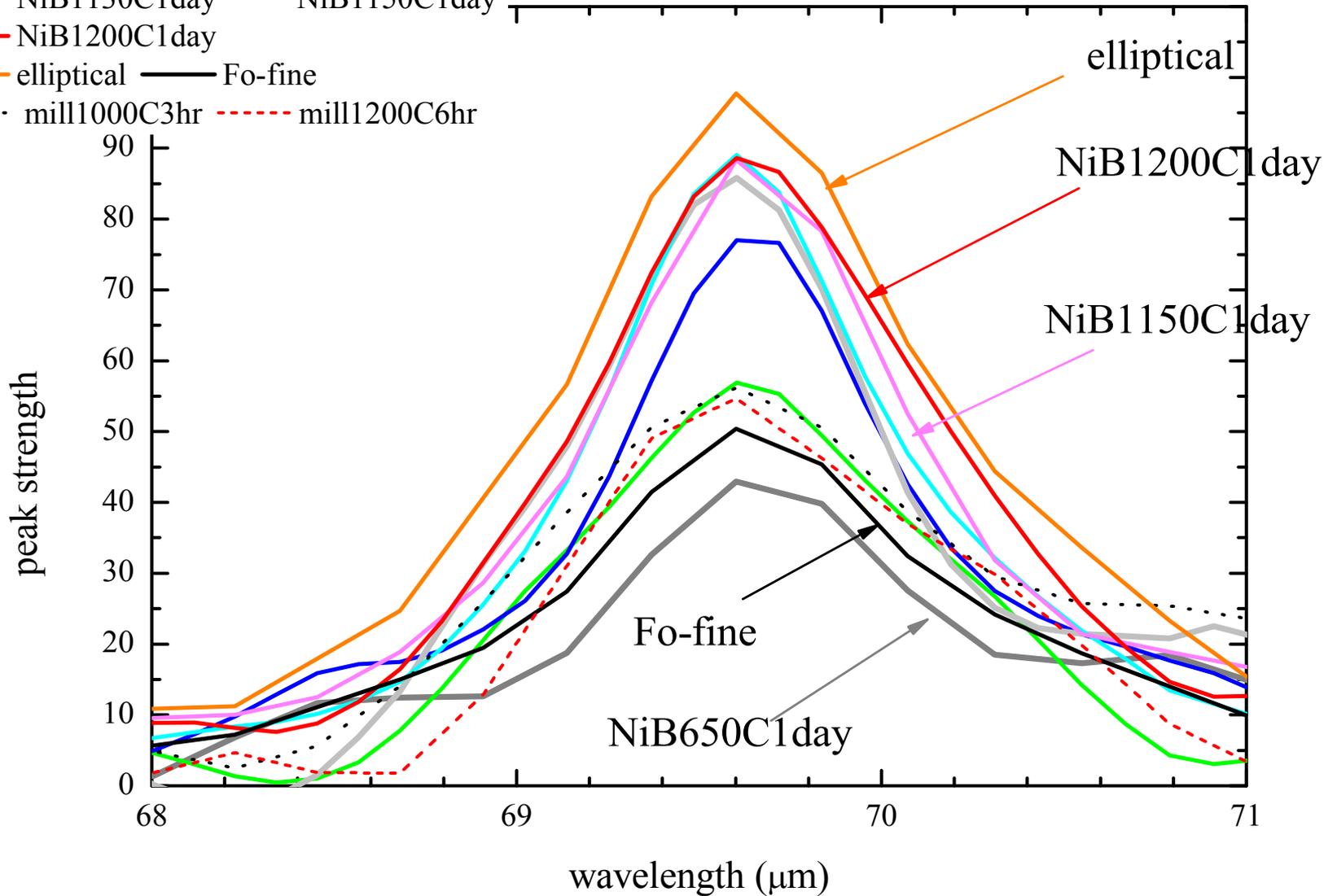


NiB forsterite



Fo 69um peak at RT

- NiB650C1day
- NiB700C1day
- NiB800C1day
- NiB1100C6hr
- NiB1130C1day
- NiB1150C1day
- NiB1200C1day
- elliptical
- Fo-fine
- mill1000C3hr
- mill1200C6hr



69 μ m peak at 室温

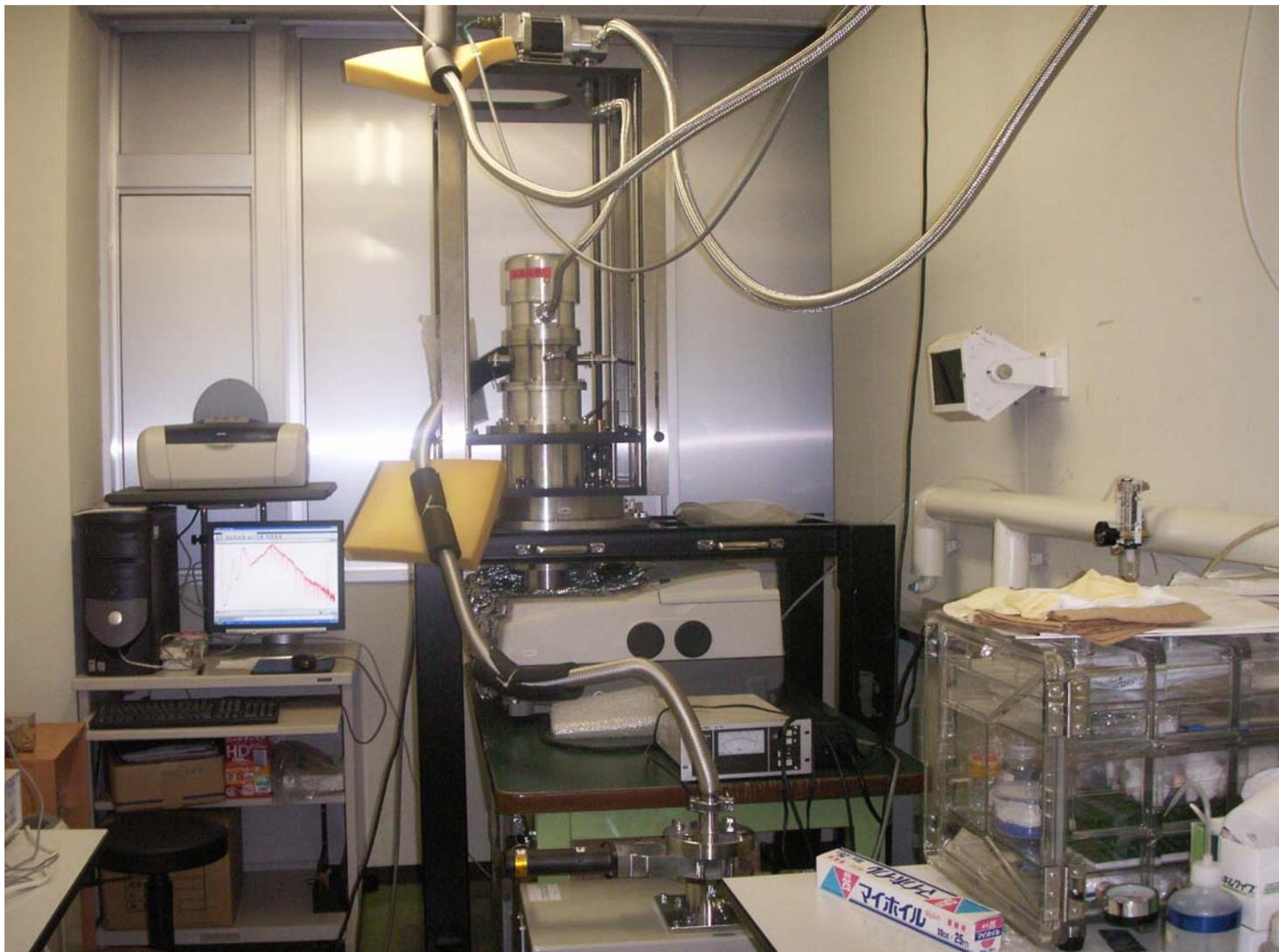
ピーク位置 形状・結晶性などによらずほとんど一定
(69.6 - 69.7 μ m)

ピークの強さ 結晶性悪い 小さい
 結晶性良い 大きい

elliptical 最大の強さ

NiB 高温でのannealing 強い

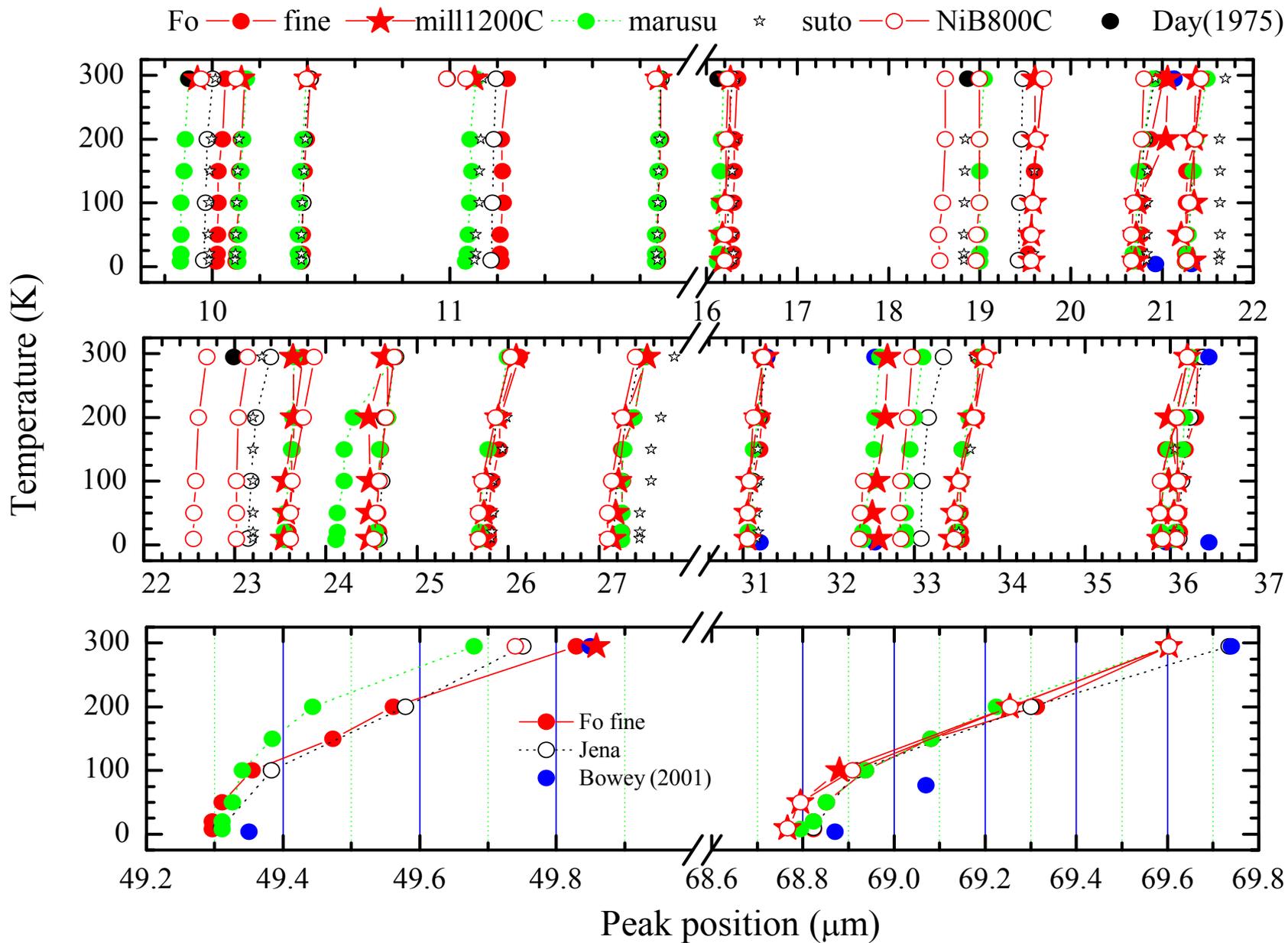
mill 1000C&1200C annealing 同じくらいの強さ

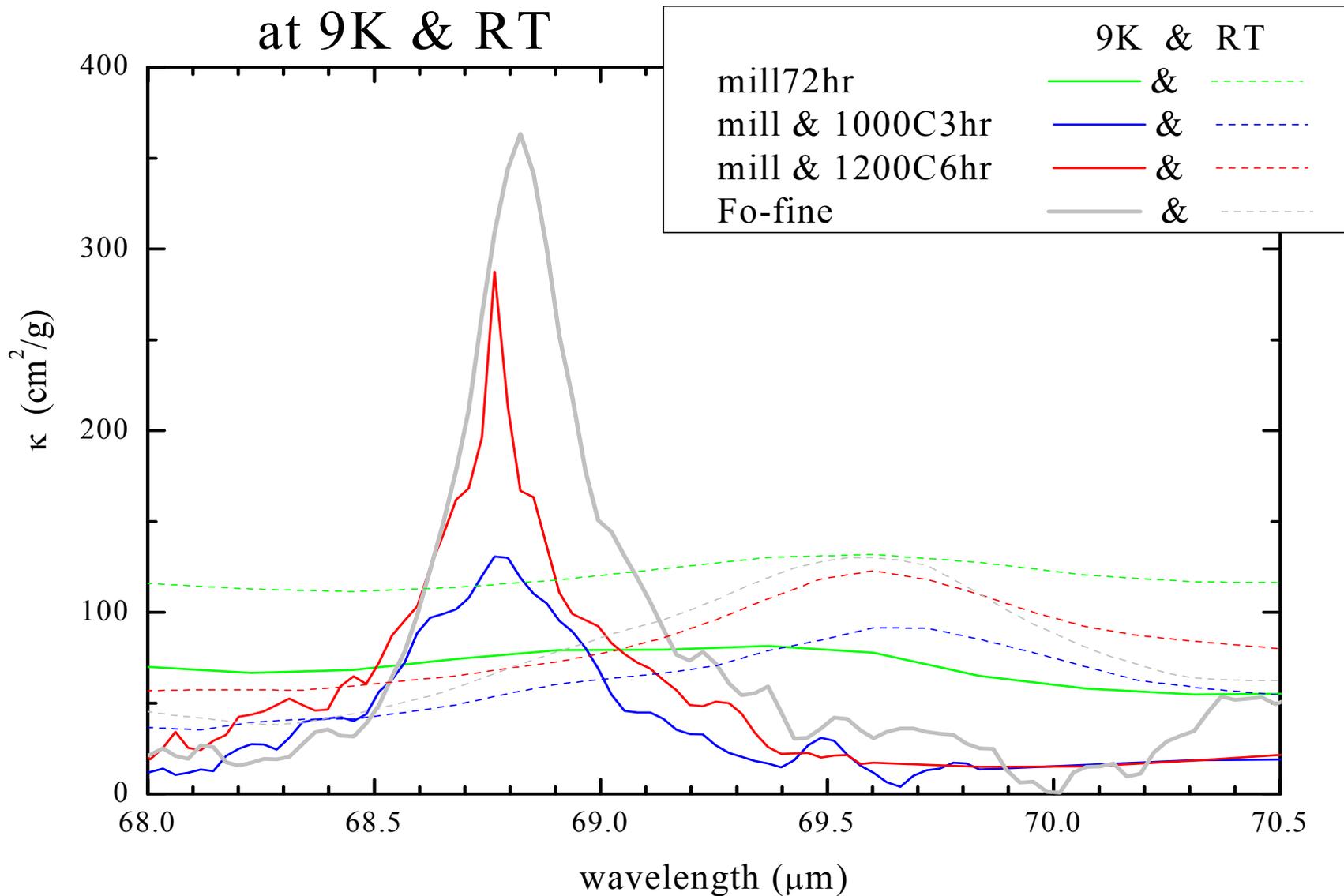


Temperature - cryostat

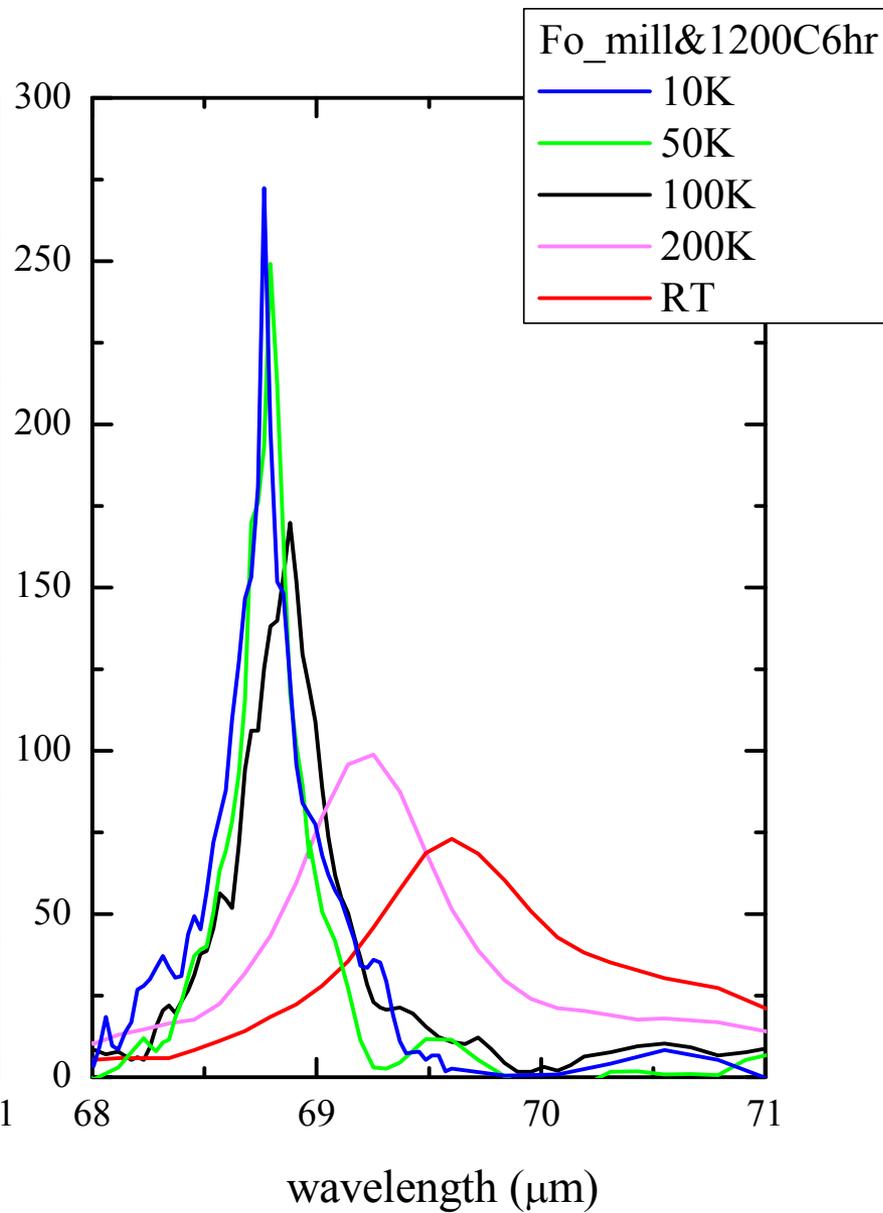
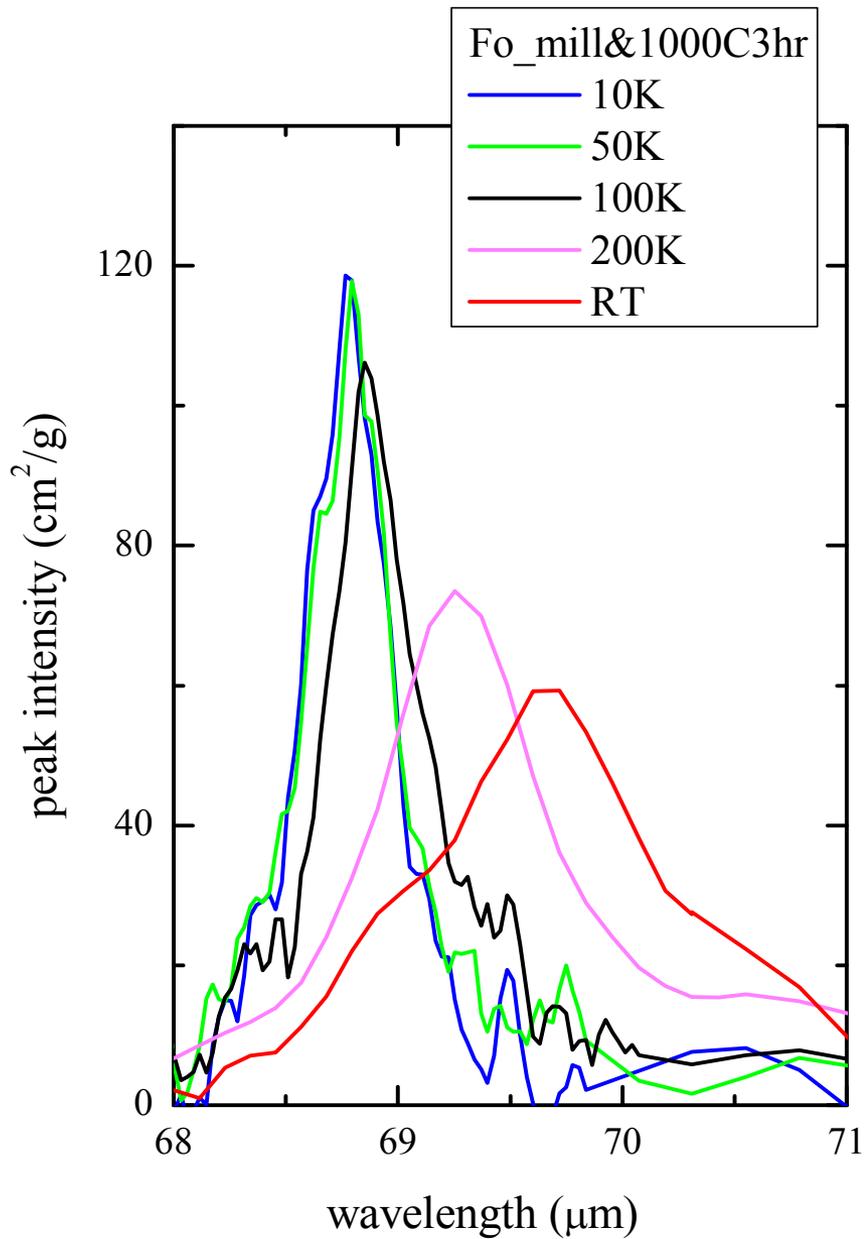
T = RT, 200K, 100K, 50K, 9K

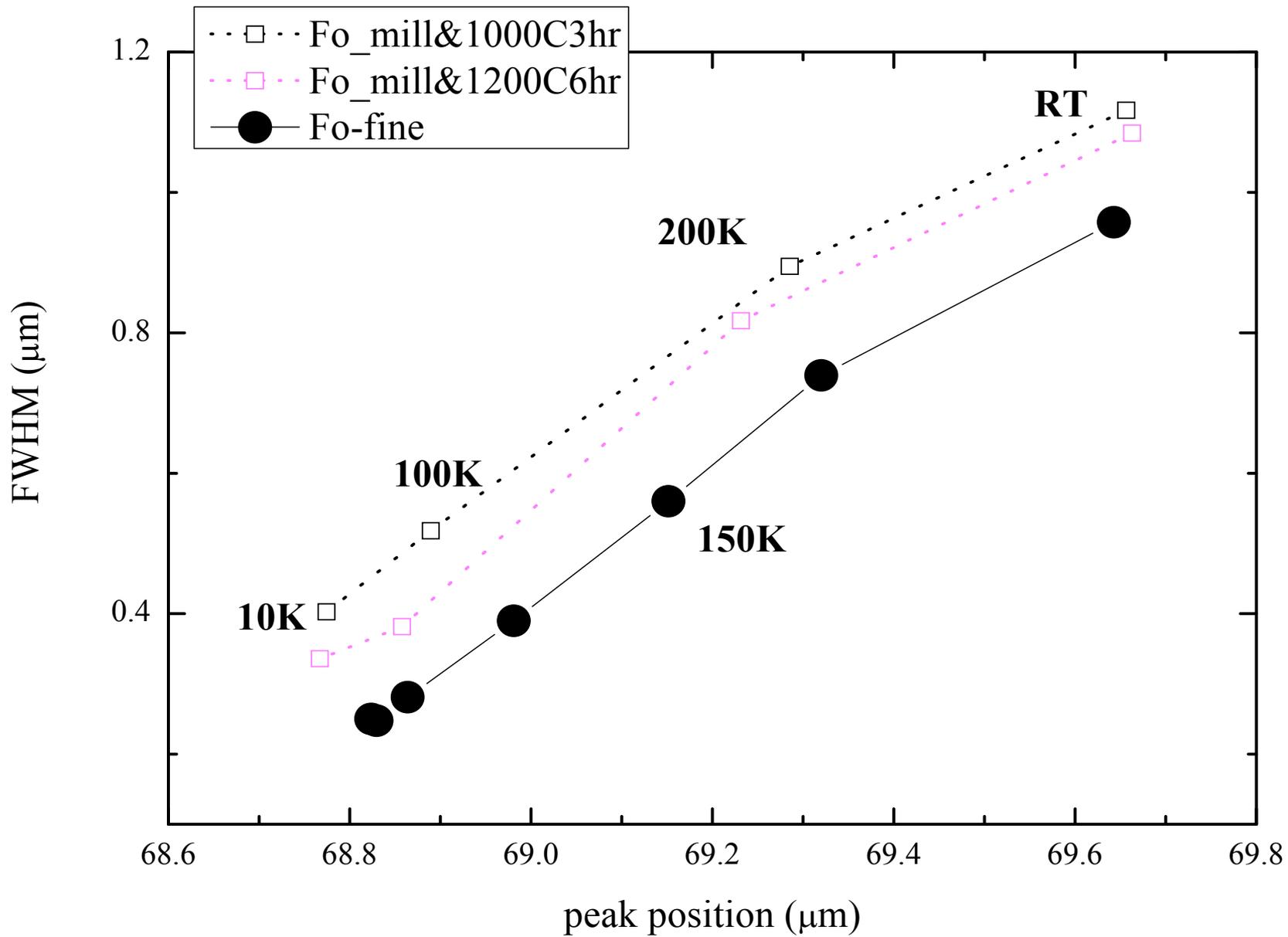
mid & far infrared region



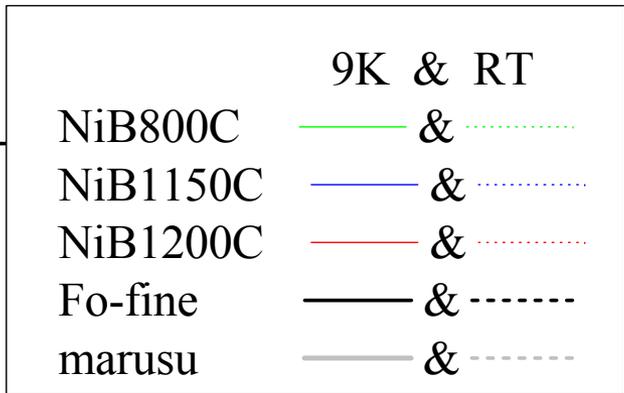
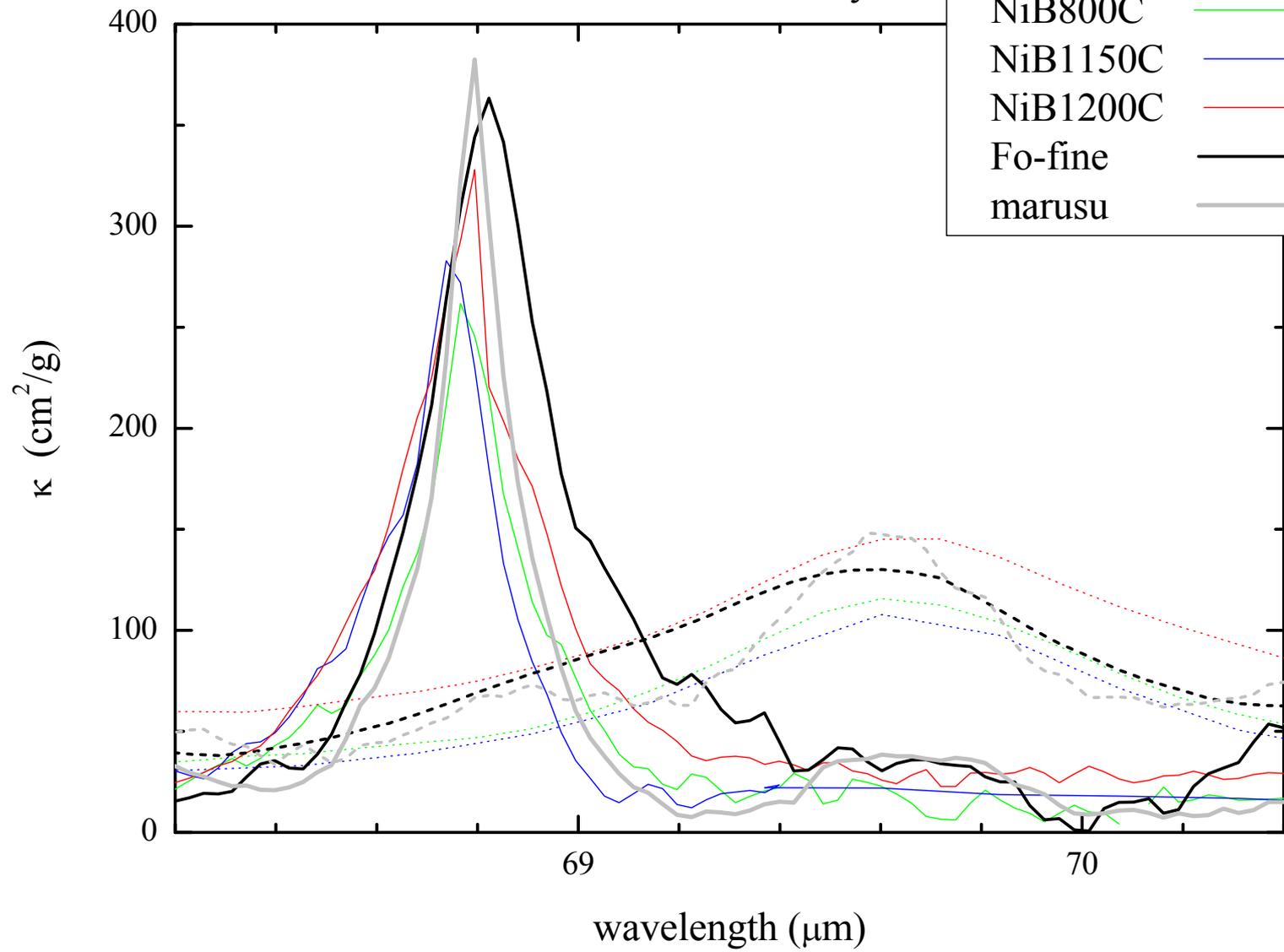


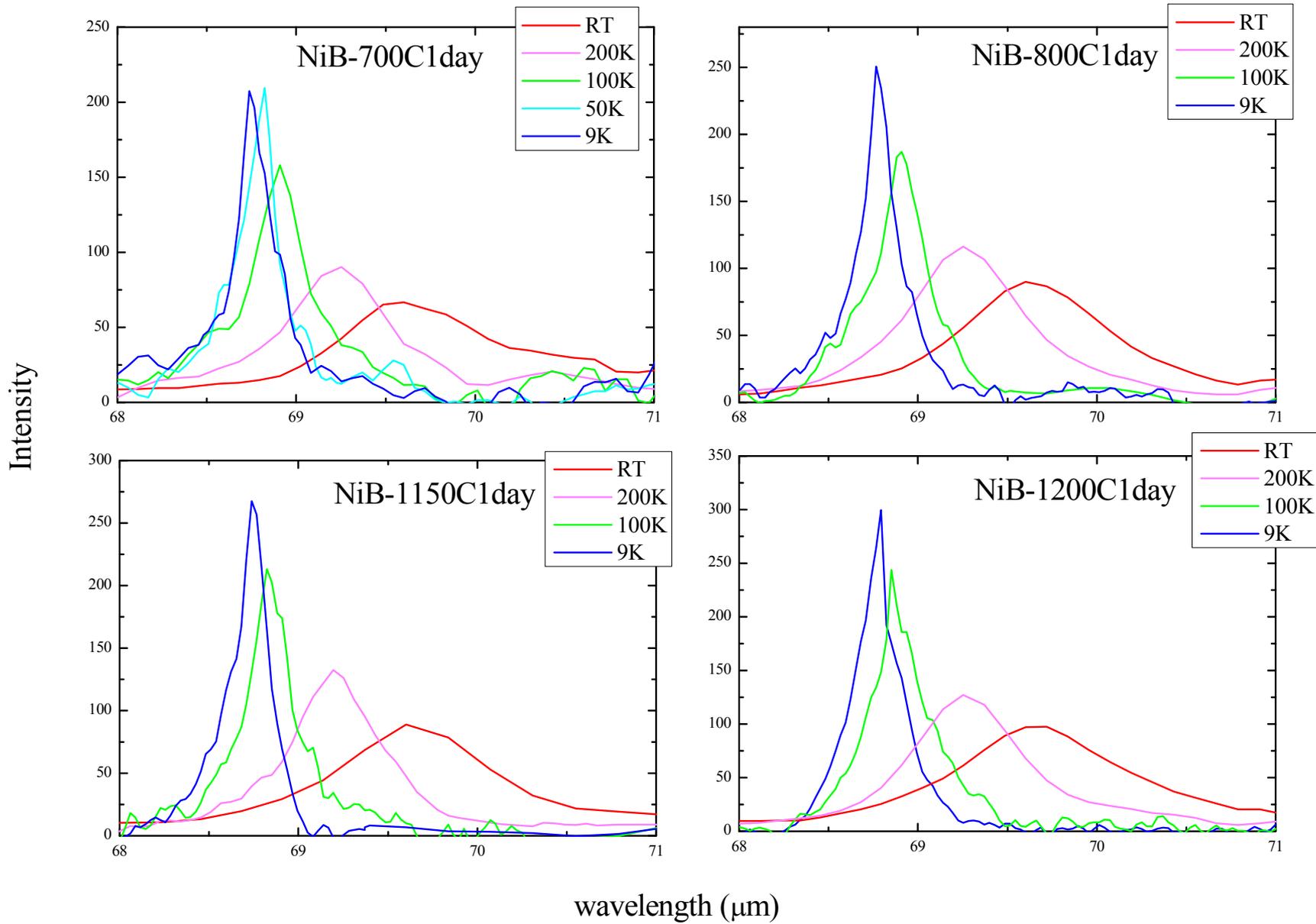
Peak fitting → *peak position, FWHM, intensity ?*

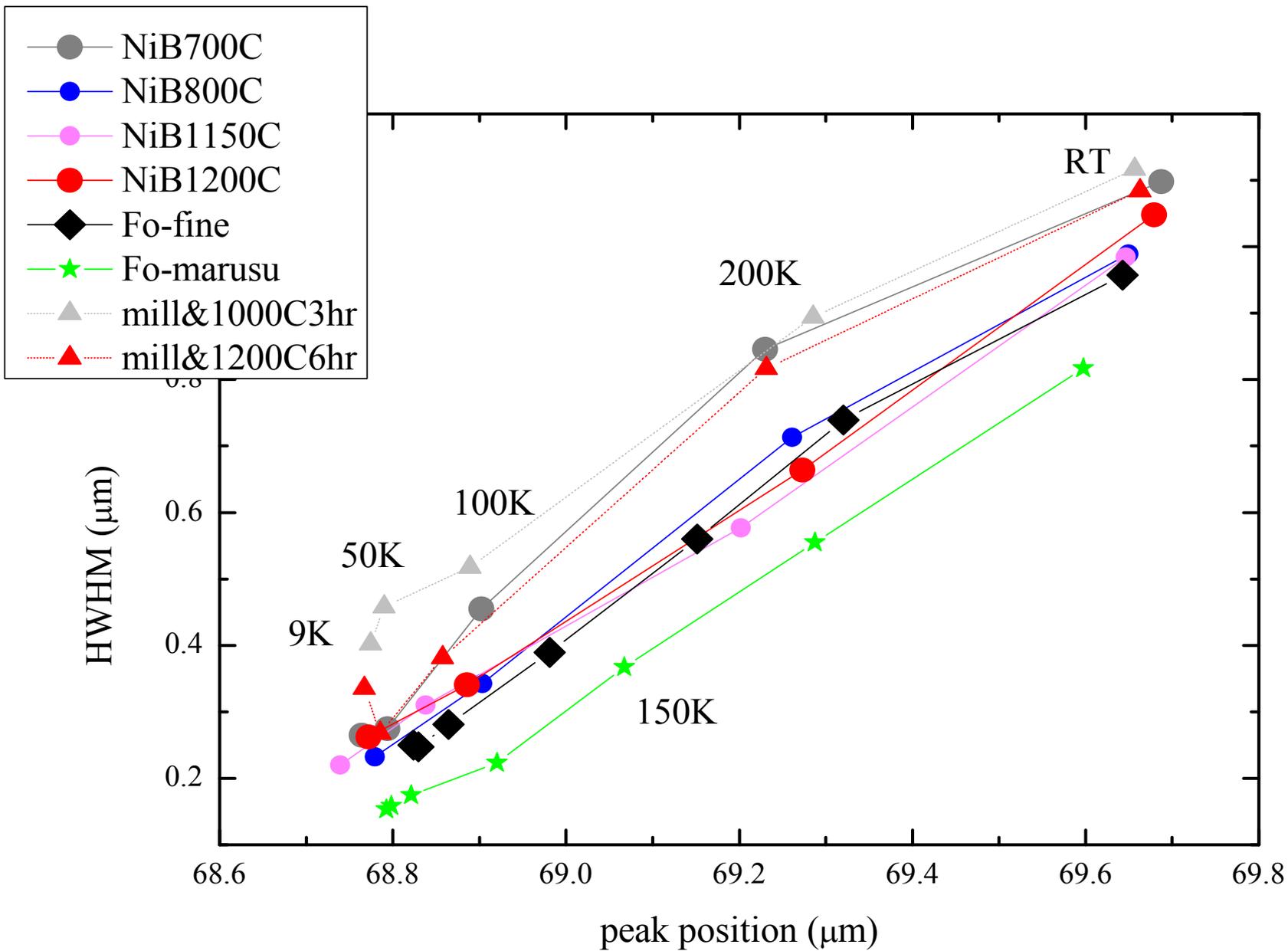


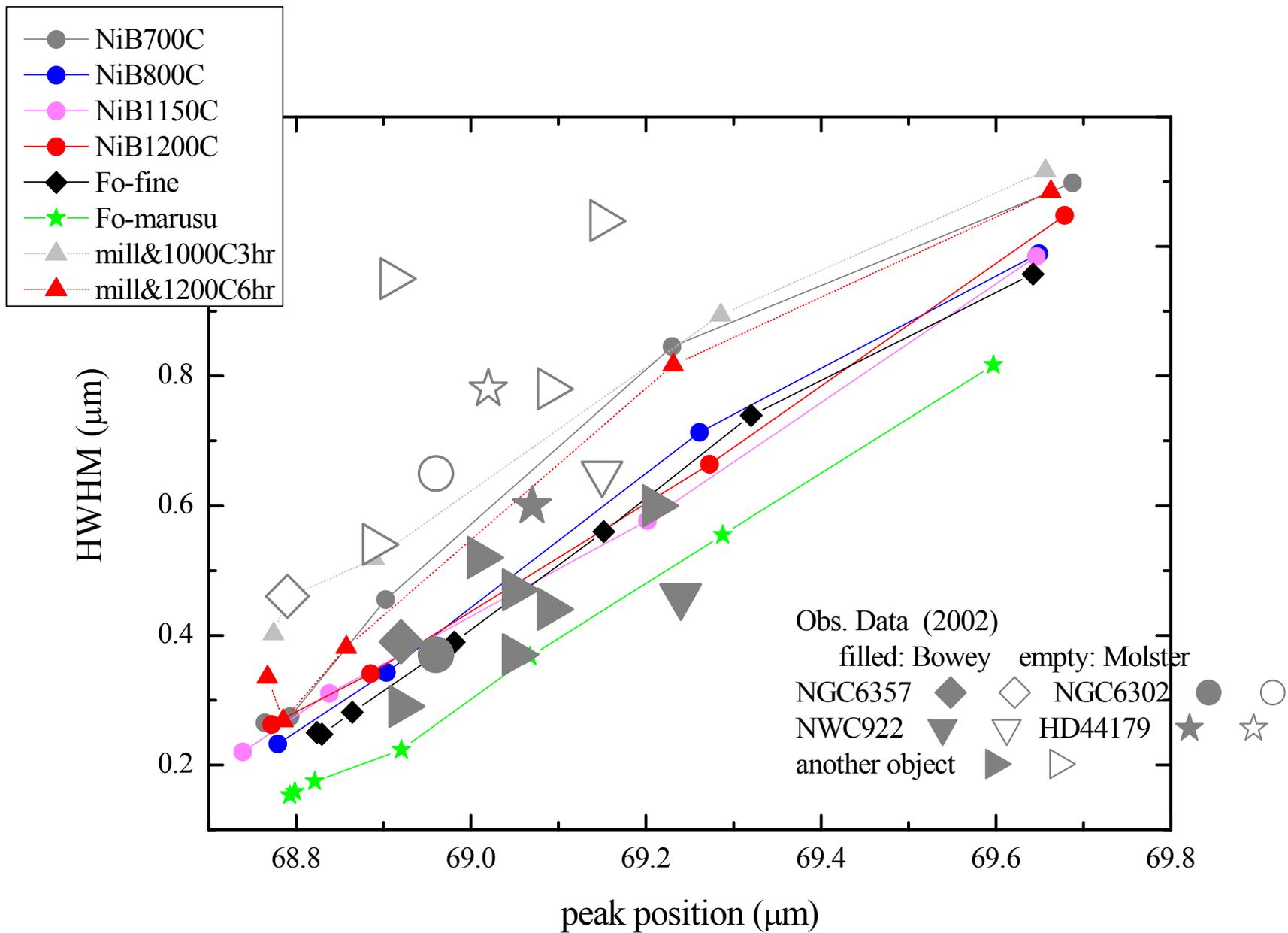


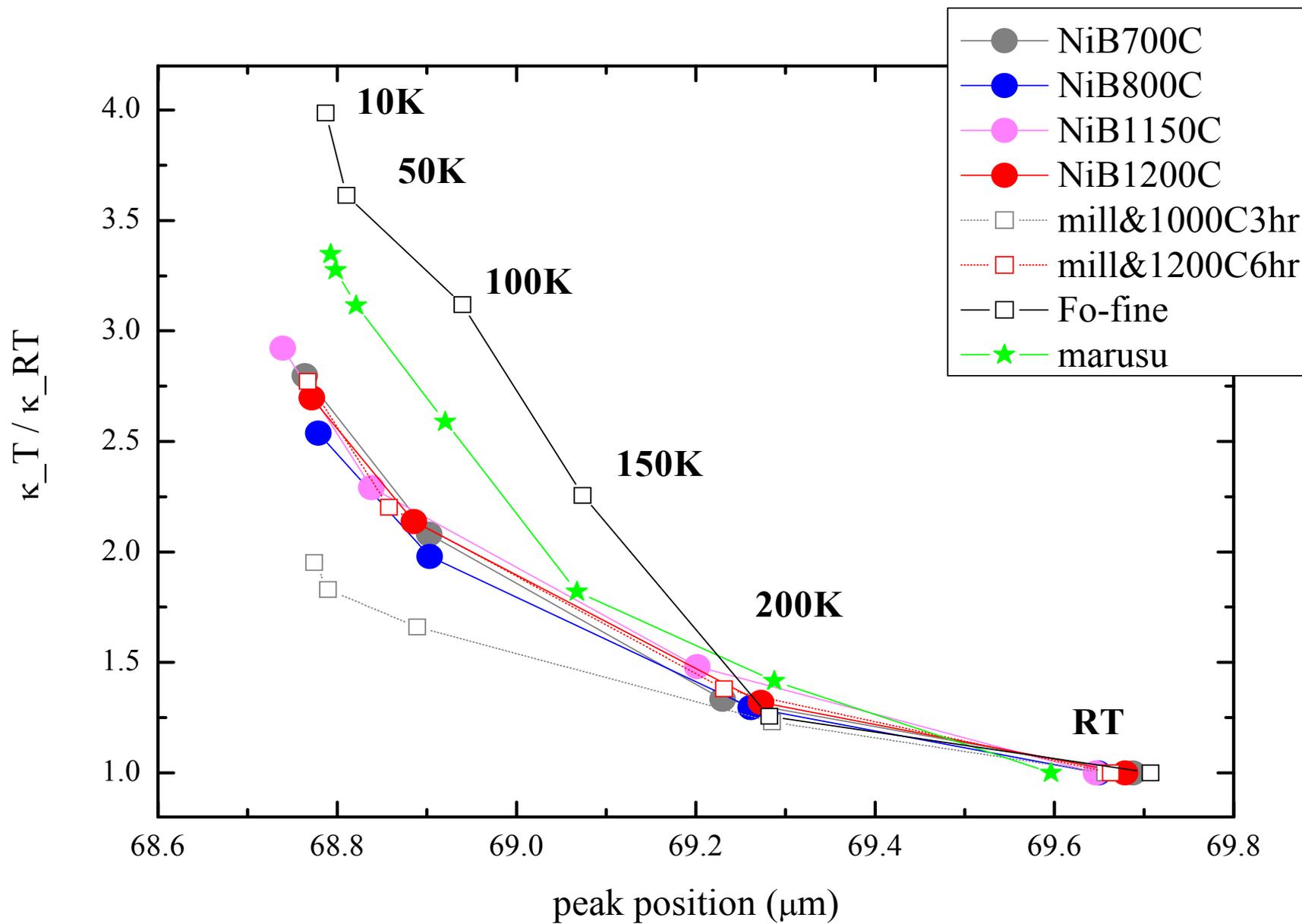
NiB 800C&1150C&1200C1day

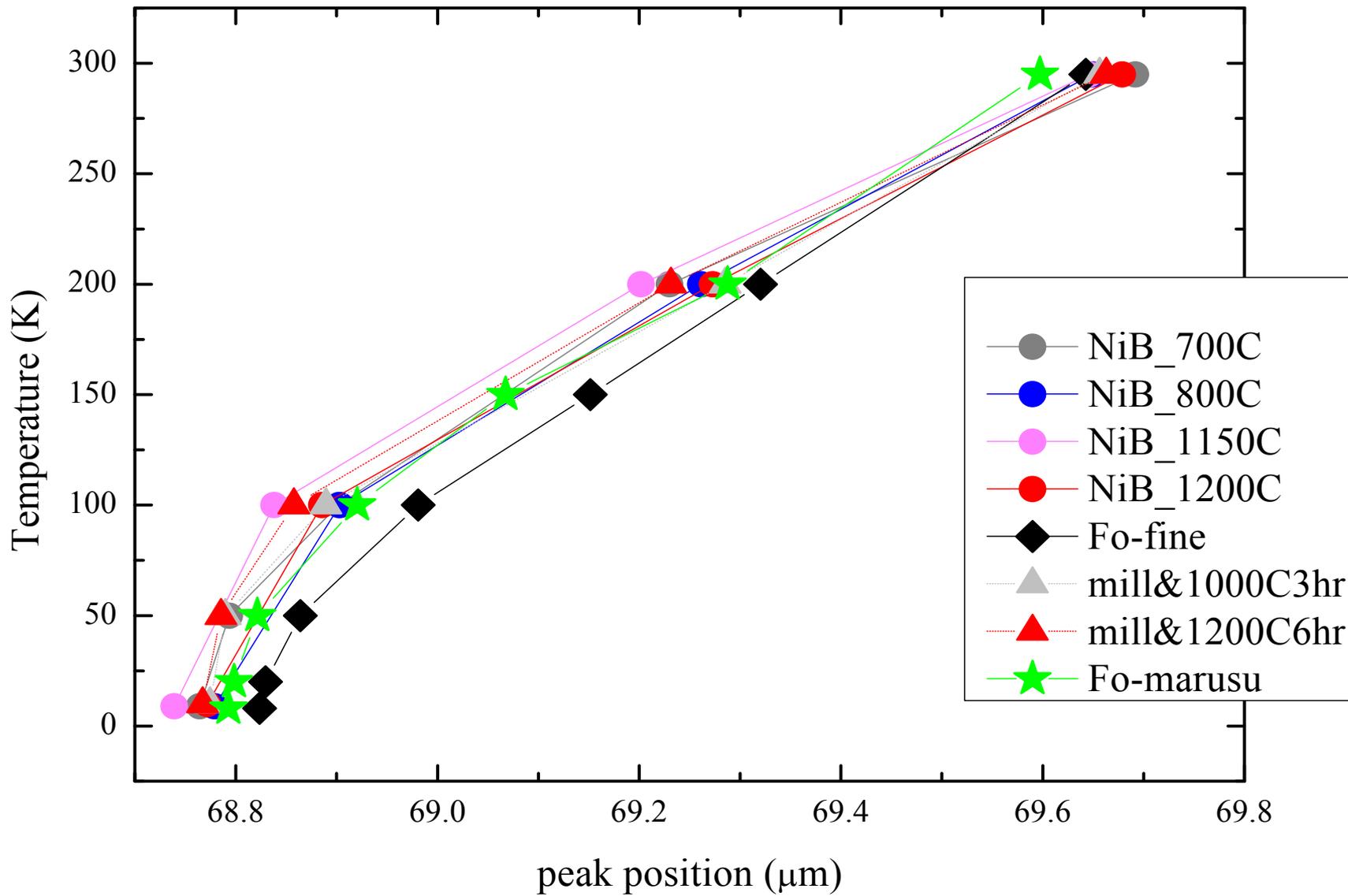


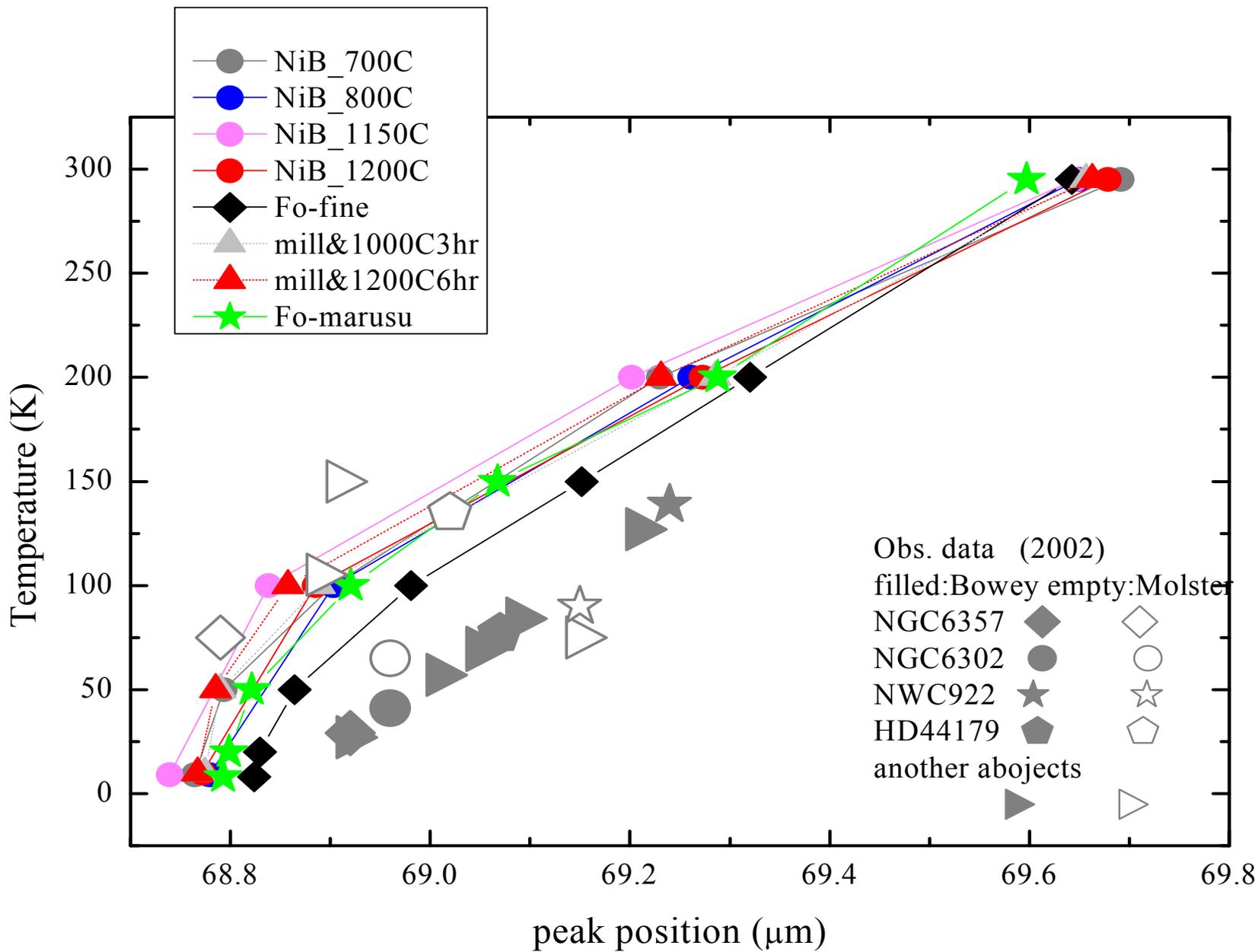












69 μ m peak

at 室温

at 低温

ピーク位置 形状・結晶性などによらずほとんど一定
(69.6 - 69.7 μ m) \rightarrow 0.1 μ m の範囲で一定

ピークの強さ 結晶性悪い 小さい
 結晶性良い 大きい

elliptical 最大の強さ \rightarrow 最大のシャープさ

NiB 高温でのannealing 強い

Fine \rightarrow 低温では 強度の強さの割合 最大

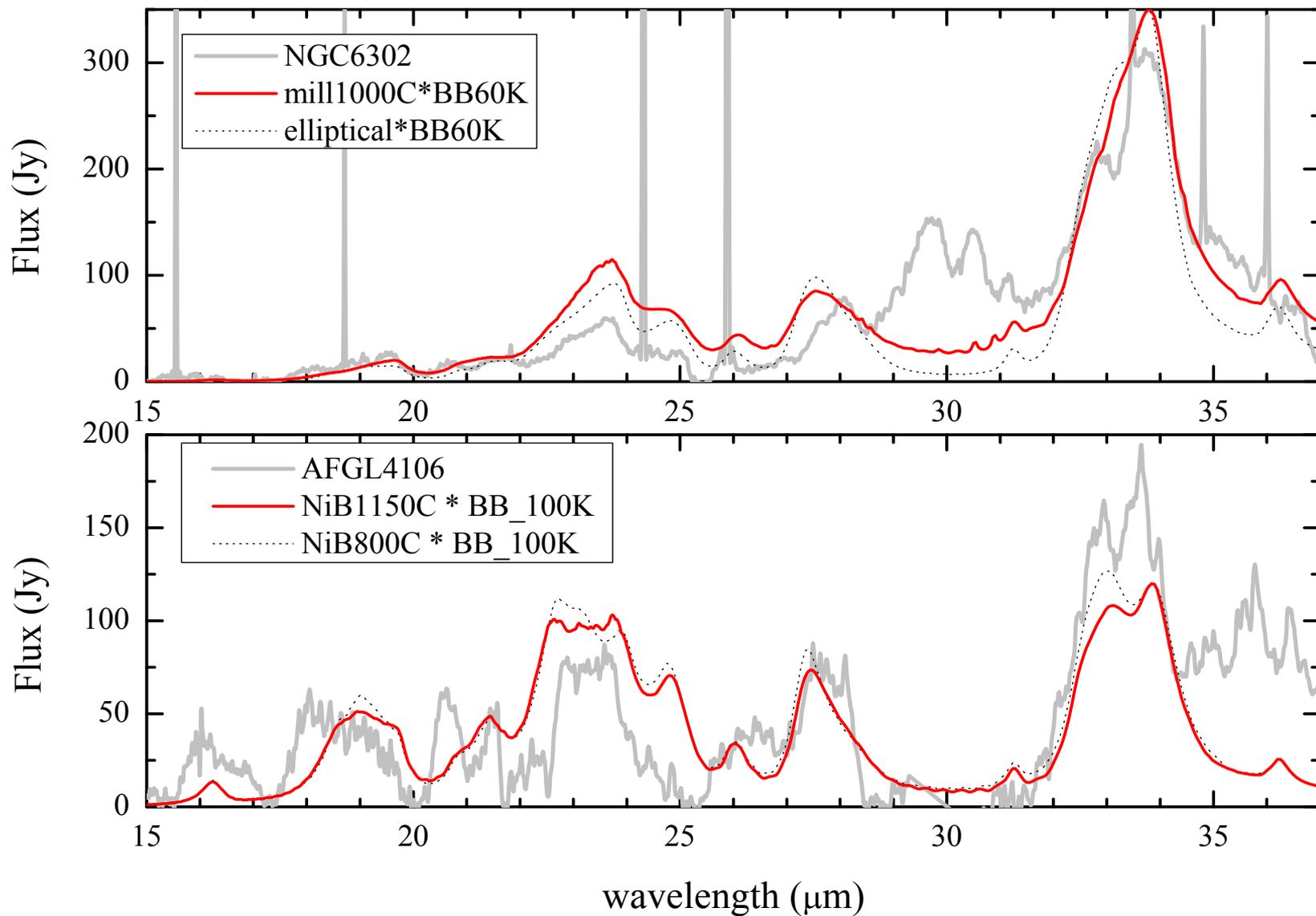
mill 1000C&1200C annealing 同じくらいの強さ

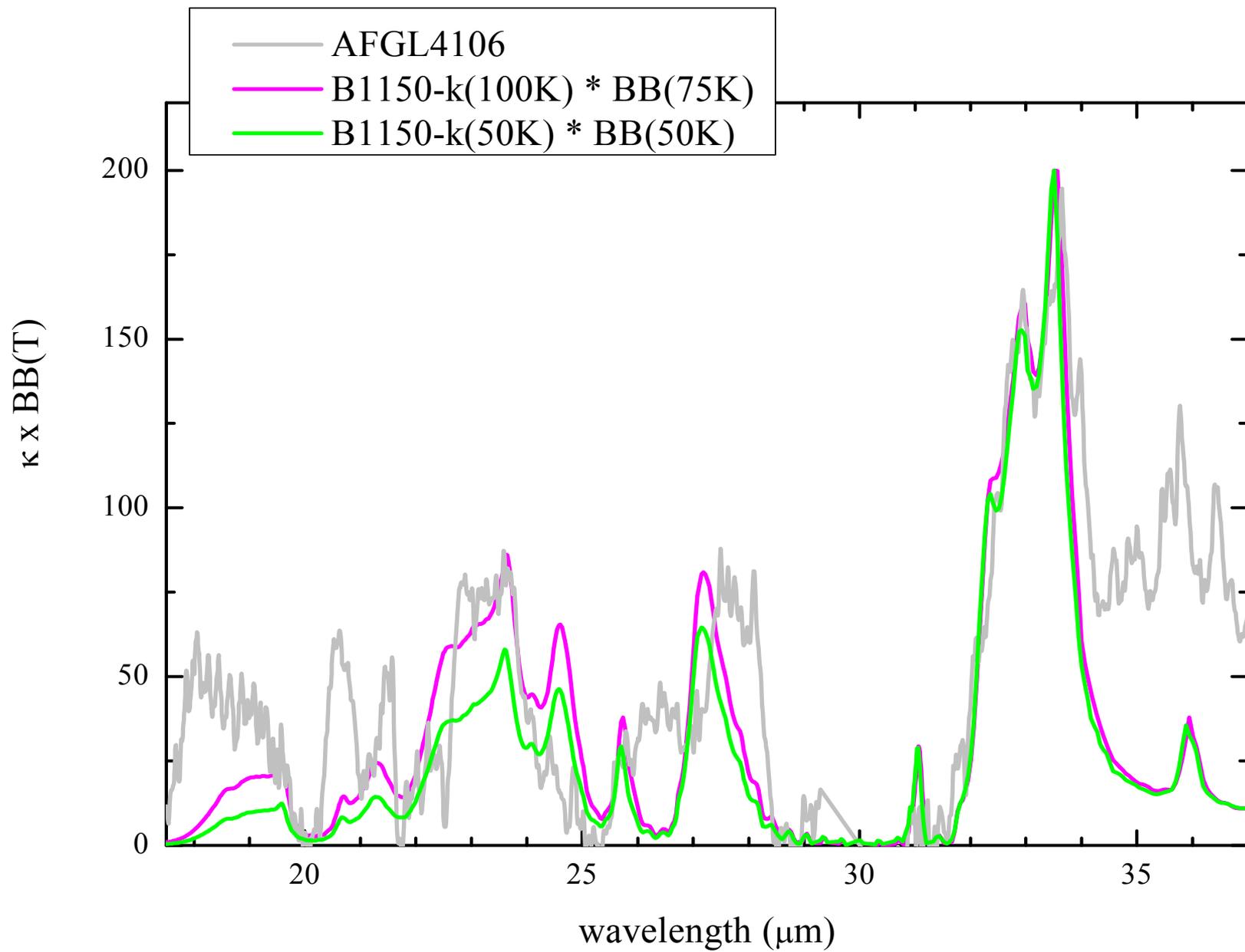
\rightarrow 低温では 結晶性が悪いと 強くなる

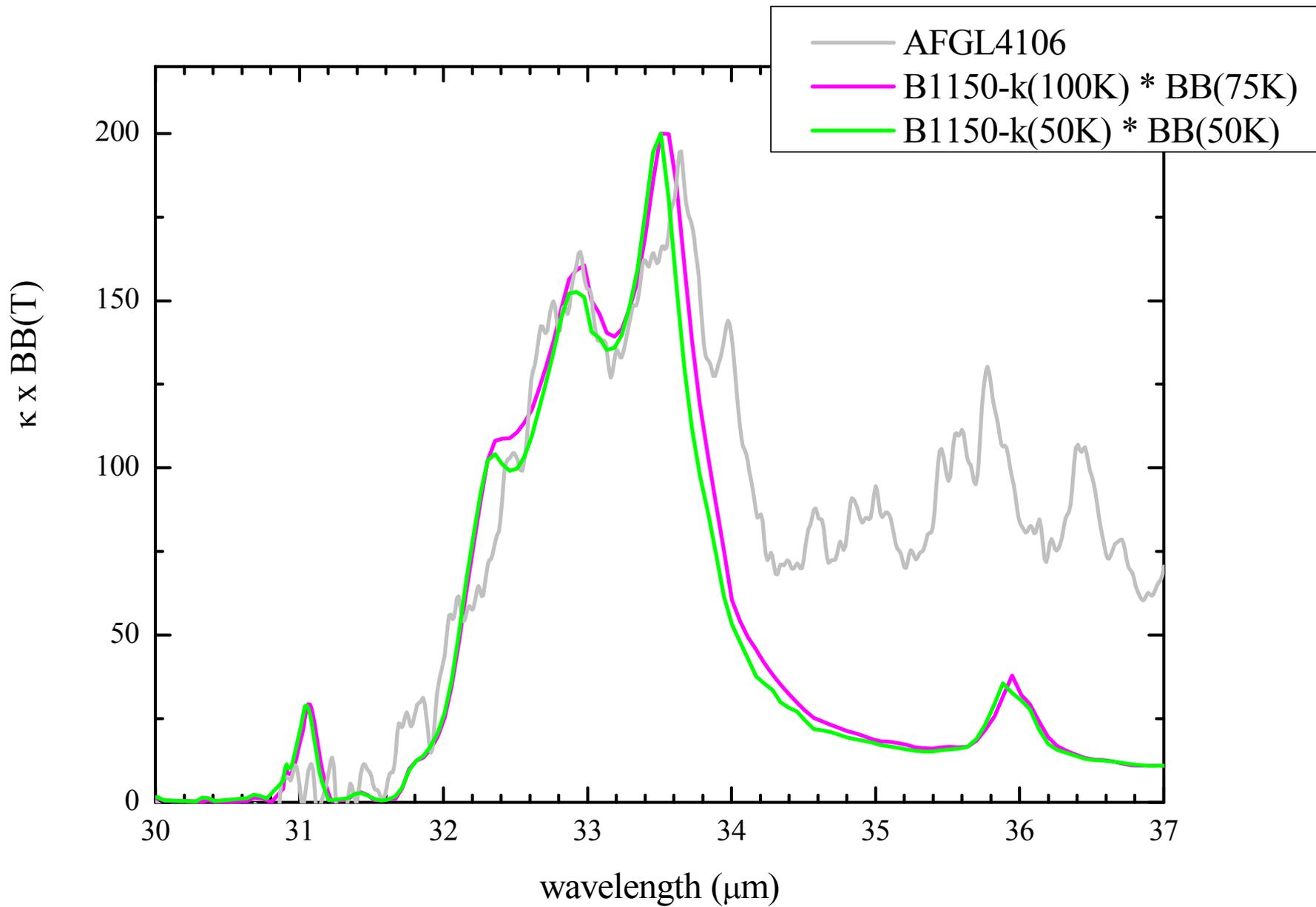
1000C annealing ピークはあまり鋭くない

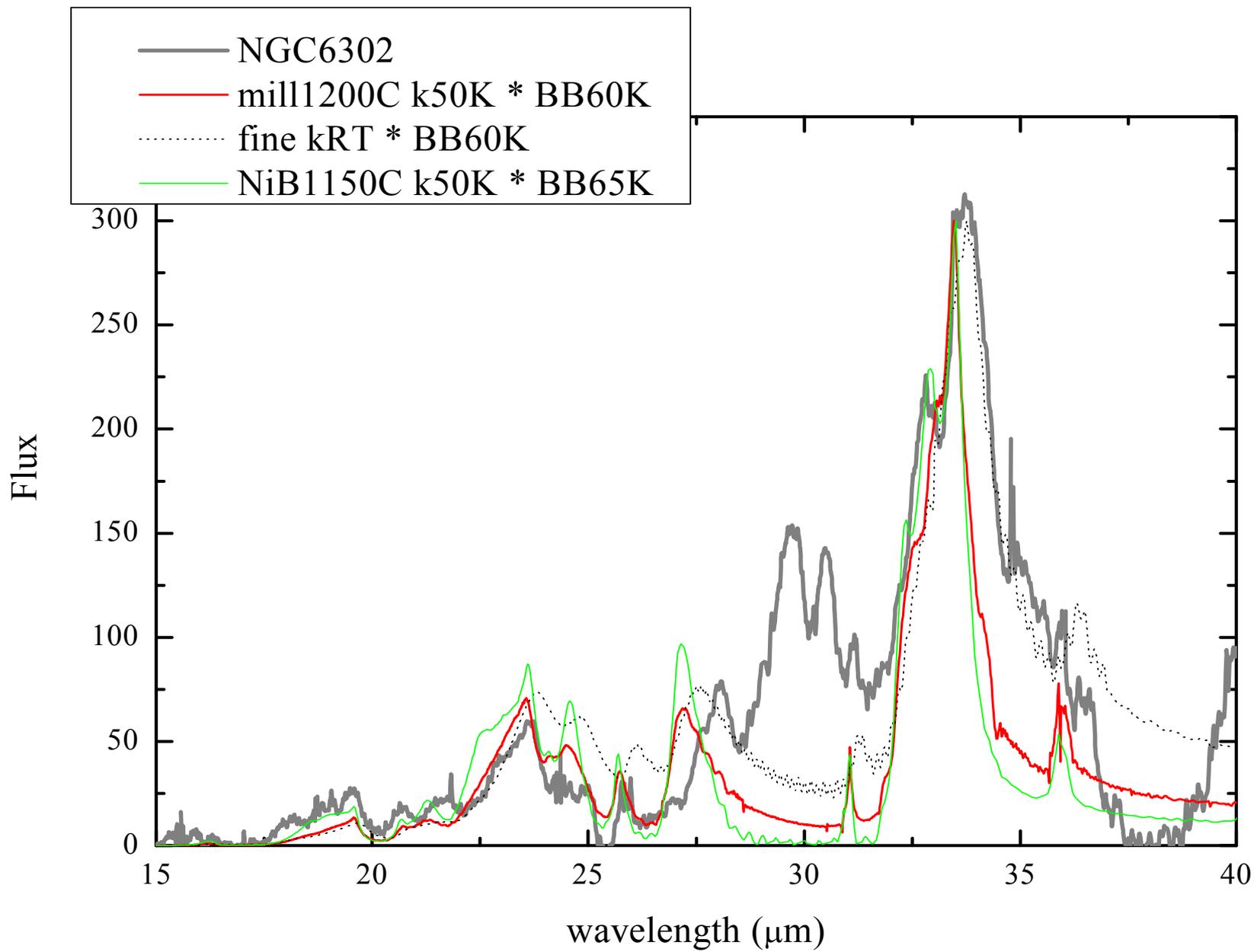
1200C annealing ピークはシャープで強くなる

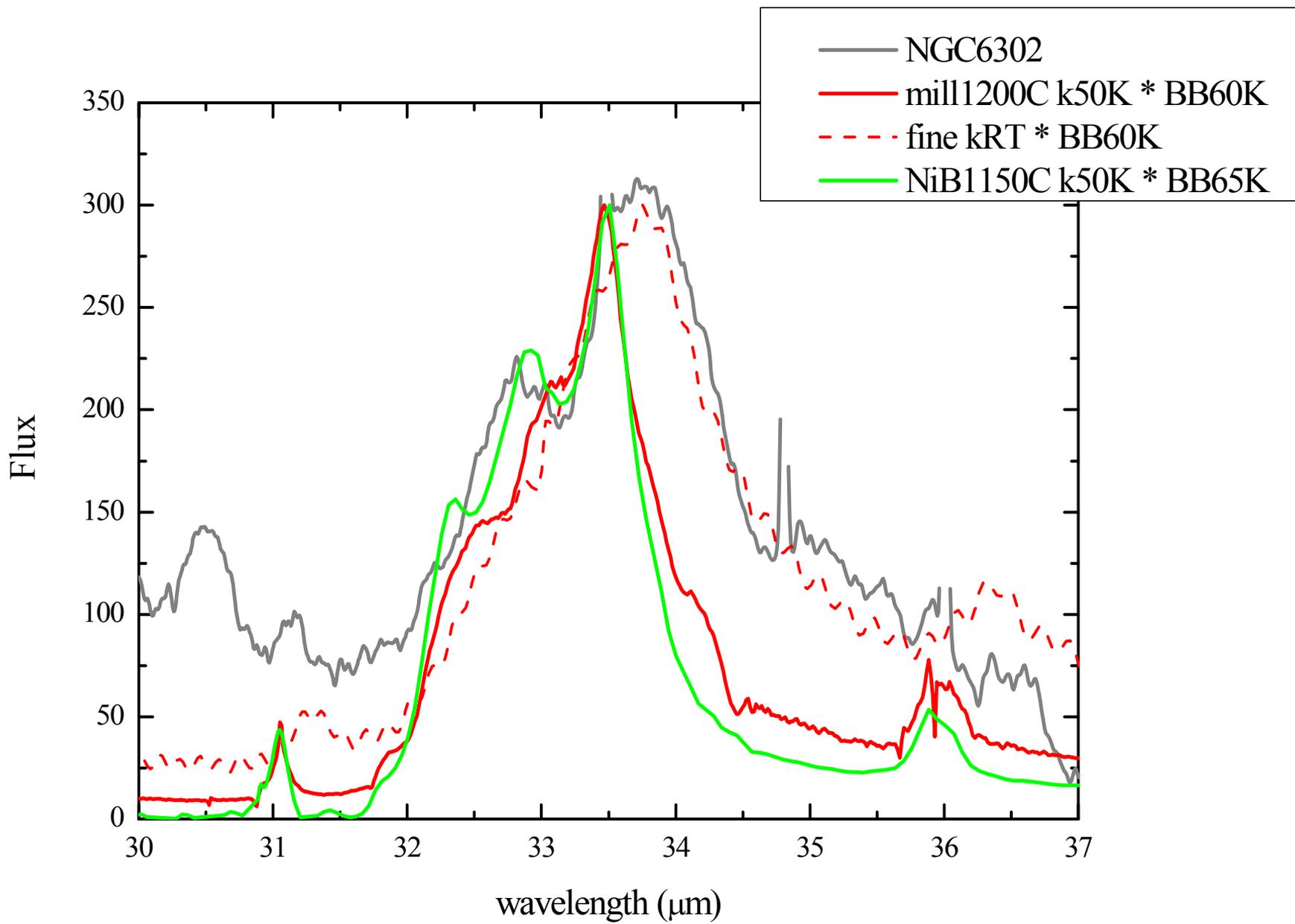
Fo $k(RT) \times BB(T)$











69 μm peak at 室温 at 低温 観測との比較

ピーク位置 形状・結晶性などによらずほとんど一定

(69.6 - 69.7 μm) \rightarrow 0.1 μm の範囲で一定

ピークの強さ 結晶性悪い 弱い \rightarrow outflow sources では検出されない
結晶性良い 強い \rightarrow disk sources では検出

elliptical 最大の強さ \rightarrow 最大のシャープさ

NiB 高温でのannealing 強い

Fine \rightarrow 低温では 強度の強さの割合 最大

mill 1000C&1200C annealing 同じくらいの強さ

\rightarrow 低温では 結晶性が悪いと 強くなる

1000C annealing ピークはあまり鋭くならない

1200C annealing ピークはシャープで強くなる

33 μm ピーク

outflow sources \rightarrow NiB1150C(球形のFo)

disk sources \rightarrow Fo-fine などの室温でのデータをいれないと再現困難