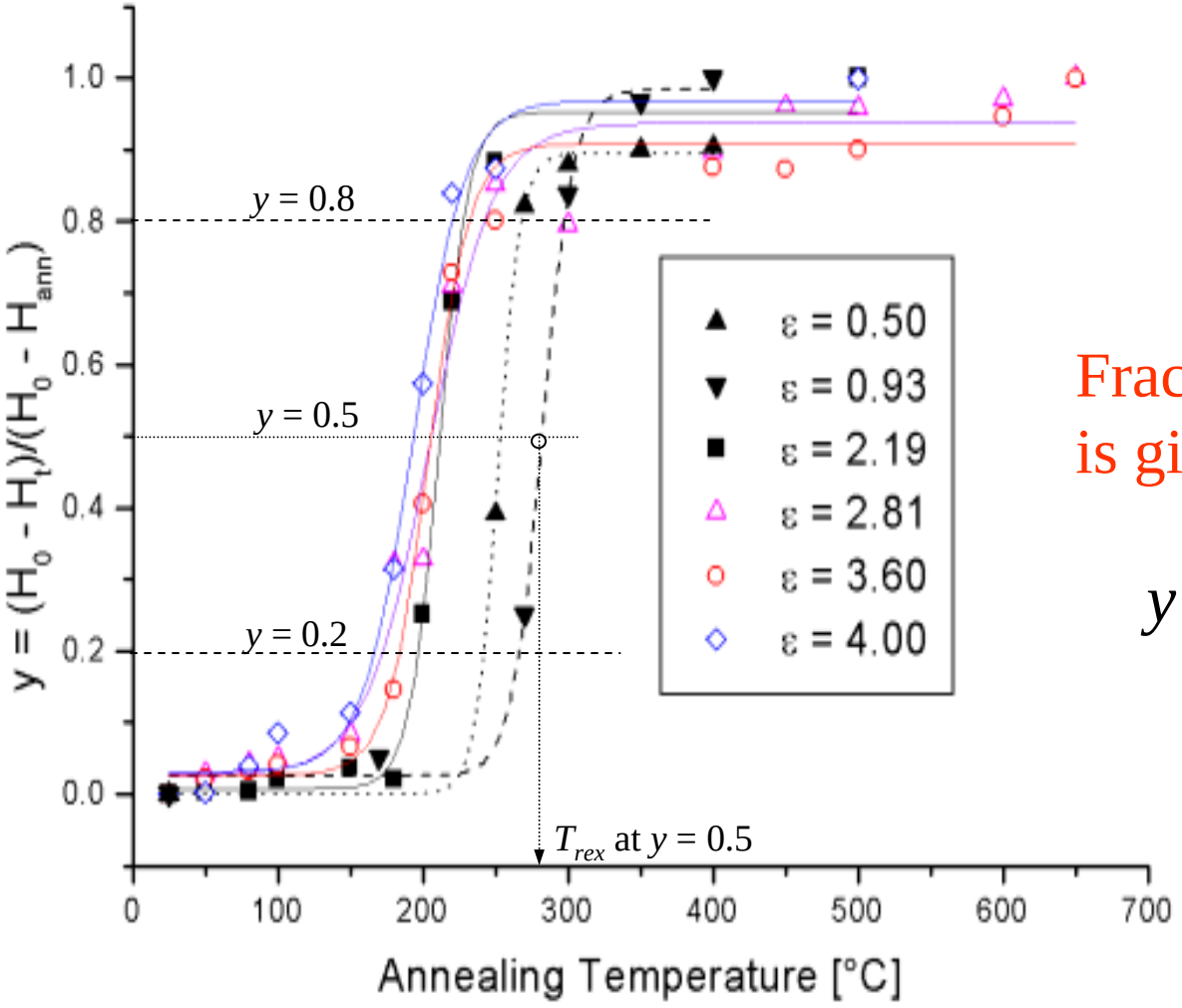
RECRYSTALLIZATION TEMPERATURE



Fraction transformed is given by

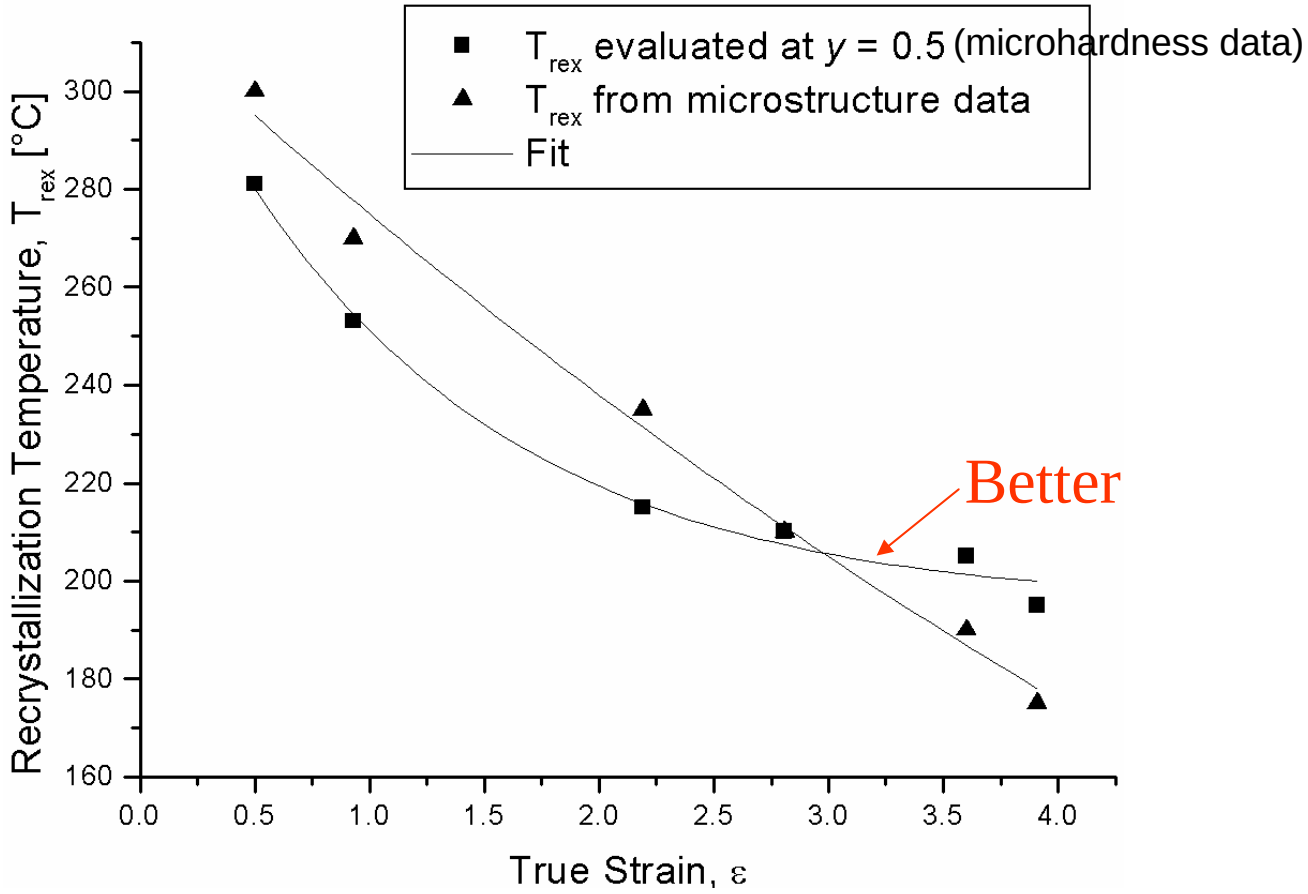
$$y = \frac{(H_0 - H_t)}{(H_0 - H_{ann})}$$

RESULTS – RECRYSTALLIZATION TEMPERATURE

T_{rex}, defined as the temperature at which the material is 50% recrystallized when annealing is carried out for 1 hour

- Methods used to determine T_{rex}
  - microstructural observation using optical microscope
  - evaluated from microhardness (i.e. at $y = 0.5$).

RESULTS – RECRYSTALLIZATION TEMPERATURE



Effect of processing strain on the recrystallization temperature of heavily drawn OFHC copper wires

RESULTS – PROPOSED MODEL

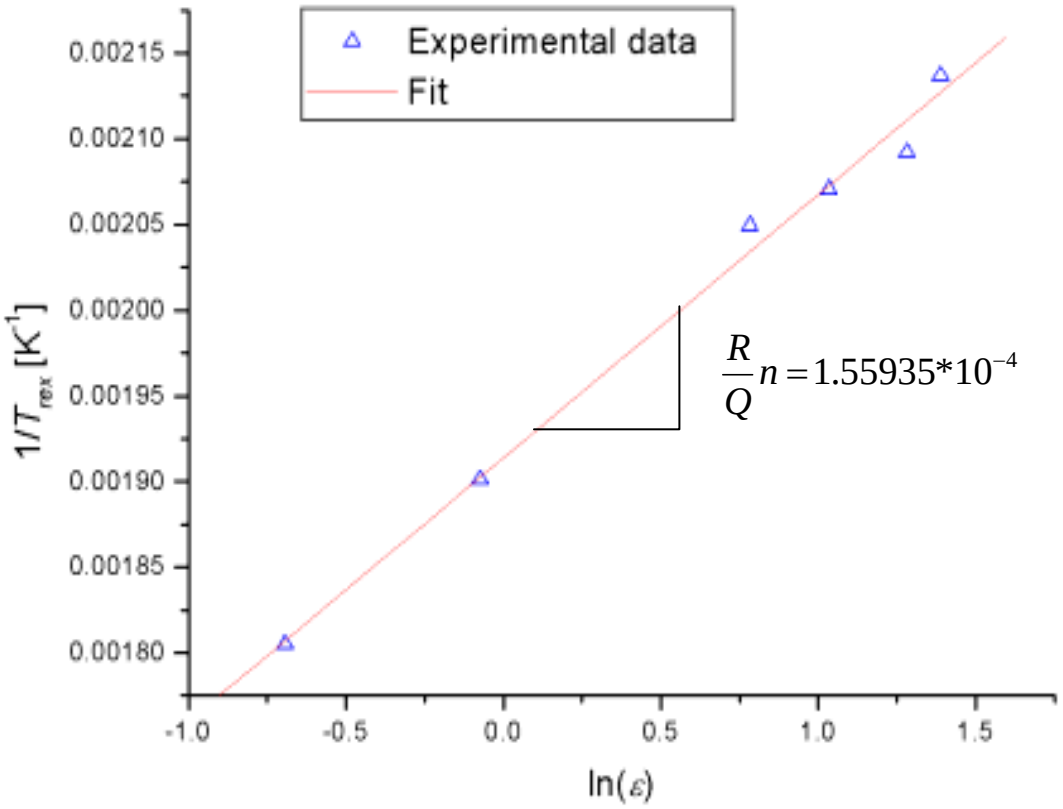
- Time for 50% static recrystallization ($t_{0.5}$) is temperature dependent and is often found to obey an Arrhenius type relationship of the form

$$t_{0.5}^{-1} = c\exp\left(-\frac{Q}{RT}\right)$$

- From experimental data, $t_{0.5} \propto \varepsilon^{n}$
- Thus, $$\varepsilon^{-n} = A\exp\left(-\frac{Q}{RT_{rex}}\right)$$
- Which can be rearranged to

$$\frac{1}{T_{rex}} = \frac{R}{Q}n\ln\varepsilon + \frac{R}{Q}\ln A$$

RECRYSTALLIZATION TEMPERATURE



- With n = 4, and R = 8.314472 Jmol^{-1}K^{-1}, the activation energy, Q ≈ 200 kJmol^{-1} (very close to the activation energy for lattice diffusion, Q_v = 197 kJ/mol)