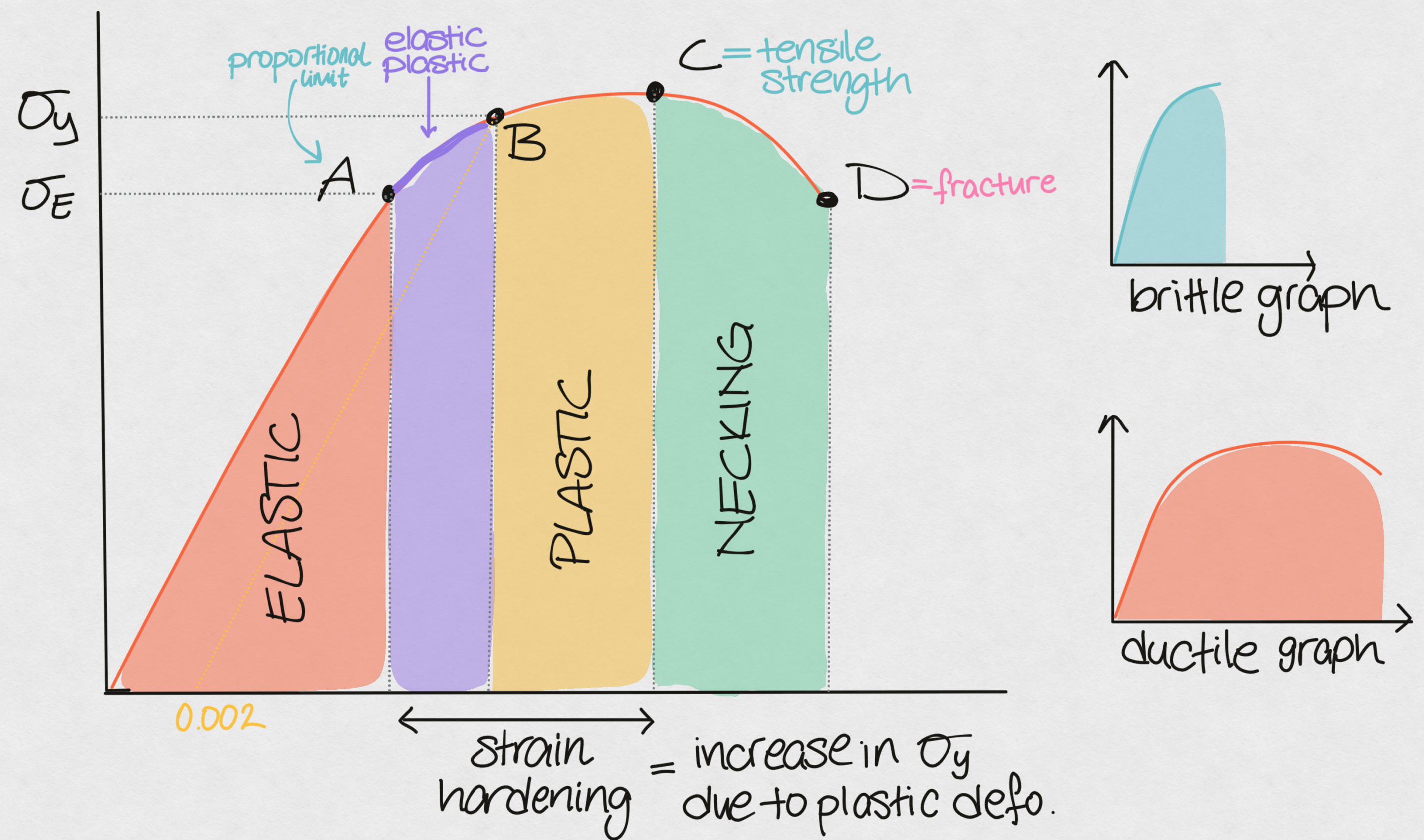


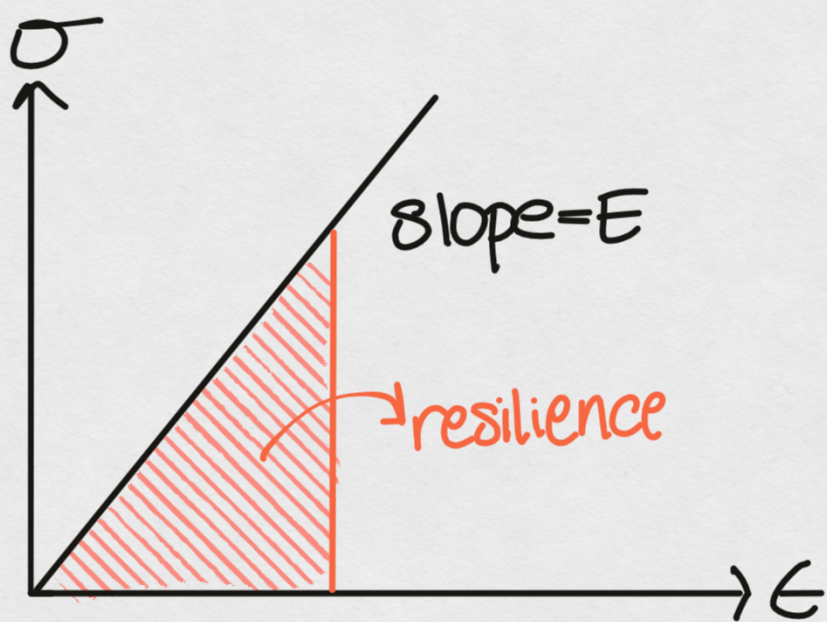
P: proportional limit, gradual elastic to plastic



Ductility: degree of plastic deformation sustained at fracture.

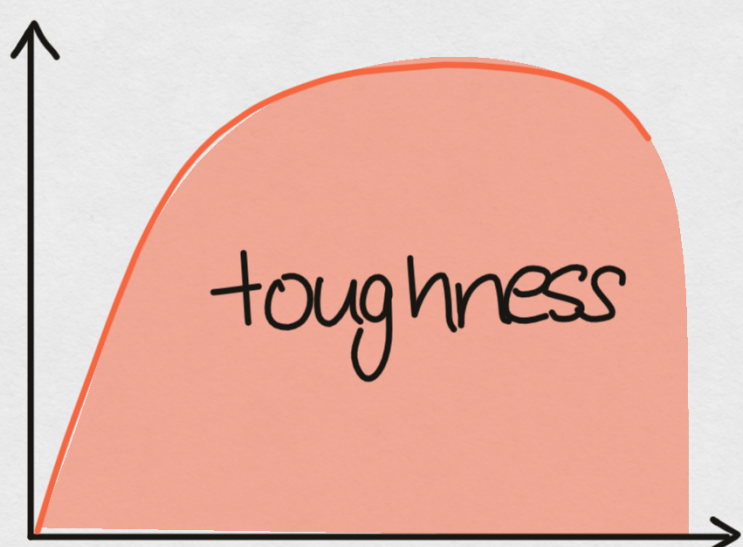
$$= \%EL = \left(\frac{l_f - l_0}{l_0} \right) \times 100 \text{ also } RA\%$$

with temperature: yield strength ↓ ductility ↑
tensile strength ↓
E does not change



resilience: the energy material can absorb elastically and release when the load is removed

$$U_r = \frac{1}{2} \sigma_y \epsilon_y$$



toughness: total energy a material can absorb until fracture.