propagation is the critical stage in ductile cleavage. Because microcracks are not observed in the brittle specimens away from the fracture surfaces it appears quite possible that the first crack to be nucleated will propagate.

If, at T_T, stresses for crack nucleation, σ_N, and propagation, σ_P, are equal and equal to the yield stress, then:

$$\sigma_C = \sigma_N = \sigma_0 + k_N(Y\gamma)^{\frac{1}{2}} l_C^{-\frac{1}{2}} = \sigma_P = k_P(Y\gamma_B)^{\frac{1}{2}} l_C^{-\frac{1}{2}} \quad (5)$$

where σ_0, k_N, k_P are constants, Y is Young's modulus (4.04×10^{12} dyne cm^{-2}), γ and γ_B are the surface energies for crack nucleation (true surface energy) and crack propagation across a grain boundary respectively, and l_C the crack length, which is probably related to the grain diameter. Let us assume that l_C equals the grain diameter, l, and that k_P is $(2/\pi)^{\frac{1}{2}}$, which is given by the simplest (Griffith–Orowan–Irwin) model of surface crack propagation. γ_B then evaluates to $\sim 6 \times 10^4$ erg cm^{-2}, which compares reasonably with surface energy values estimated by HULL *et al.*[9], *e.g.* $\sim 3 \times 10^4$ erg cm^{-2} at 350°K for propagation of cracks in tungsten single crystals, in which blunting of the cracks is thought to occur above ~150°K.

Below 150°K their values of γ were near the theoretical estimates, *e.g.* on GILMAN's model[10]: 4.7×10^3 and 3.3×10^3 erg cm^{-2} for {100} and {110} cleavage, respectively[11]. Assuming the smaller value to be correct and taking[12] k_N to be ~2.4 it is also possible from eqn. (5) to estimate the lattice friction stress, σ_0. It is seen to be ~22 kg mm^{-2}, which is in excellent agreement with the value estimated by HULL *et al.*[9] at a strain rate of 5×10^{-4} sec^{-1} using a different analysis.

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