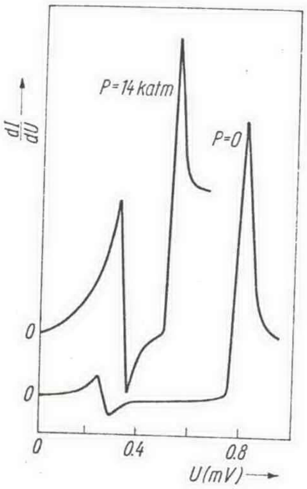

. 3. dI/dU–U characteristics of Al–I–In samples at different pressures. $T = (1.16 \pm 0.02)$ °K

accuracy in pressure measurement. excellently coincides with Berman, on massive indium.

tics for two Al–I–In samples plotted as defined from the maxima of the

fluence on the energy gap of indium. is drawn which in fact corresponds p values obtained by extrapolating ble 1. From experiments it is found

$$3) \times 10^{-5} \frac{\text{meV}}{\text{atm}} .$$

0.0) = $(3.69 \pm 0.04)\ kT_c$, is in good sion measurements of critical field here the coefficient defining a deviaparabola was found to be

$$_{\text{In}} = 2\pi\gamma \frac{T_c^2}{H_0^2} = 0.985 \tag{3}$$

$$\gamma = \frac{2}{3}\pi^2 k^2 N . \tag{4}$$

superconducting indium energy gap under pressure. ο experimental points

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On the basis of the thermodynamic relation [1]

$$\Delta = k \sqrt{\frac{\pi}{6\gamma}}\, H_0 \tag{5}$$

using (3) we have

$$\frac{\Delta}{kT_c} = 1.82\, a^{-\frac{1}{2}} . \tag{6}$$

Then from our experiments it follows that the parameter a increases with pressure from 0.985 to 1.04 ($p = 14$ katm), i.e. it approaches the BCS case. Experimenta points $\Delta h = h - (1 - t^2)$ given in [10] for indium clearly show a tendency to the above mentioned increase of a with pressure (see Fig. 6 in [10]). In principle on the basis of (5) one may estimate the change of state density N with pressure. Using our gap data and those of $H_0(p)$ from [10], the state density seems to decrease by no more than 2% at 14 katm.

Thallium: Because of quick oxidation of Tl films Al–I–Tl samples were charged in the bomb immediately after preparation, and control measurement at small pressure were carried out after some compression cycles. After such a procedure the film critical temperature was (2.38 ± 0.01) °K at zero pressure. The energy gap here is $2\,\Delta(0.0) = (0.75 \pm 0.01)$ meV $= (3.65 \pm 0.06)\ kT_c$, that is in good agreement with Clark's recent measurements [12].

In the small pressure range (2000 to 4000 atm) the anomalous change of critical temperature typical of massive pure Tl [13] was not observed. The critical temperature linearly decreased up to (2.34 ± 0.01) °K at $p = 8$ katm being in qualitative agreement with Gey's data [14] on the dependence of T_c of pure Tl on residual resistance produced by plastic deformation at different pressures.

Fig. 5 shows I–U characteristics for Al–I–Tl at different pressures. The gap value obtained at 8 katm, $2\,\Delta(8.0) = (0.73 \pm 0.01)$ meV $= (3.64 \pm 0.06)\ kT_c$, shows rather weak dependence in this pressure range. However, this does not exclude the possibility that $2\,\Delta/kT_c$ changes for thallium at higher pressures. Work in this direction is in progress.

The main result of gap tunnelling measurements in superconductors under pressure is that the effect of $2\,\Delta/kT_c$ decrease initially discovered on Pb, which is a representative of superconductors with strong electron-phonon interaction, shows different dependence on superconductors with intermediate coupling: In, Sn, and perhaps Tl. This circumstance makes theoretical investigations necessary to obtain a relation connecting the gap

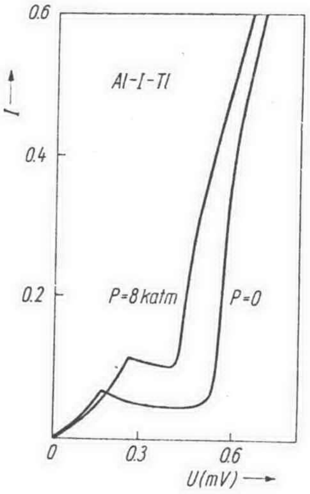

Fig. 5. Voltage-current characteristics of Al–I–Tl samples at different pressures. $T = (1.16 \pm 0.02)$ °K; normalized units are along the I-axis