

influence on superconductivity
critical temperature T_c and critical
field that $2 \Delta/kT_c$ does not change

for the study of the energy gap in
technique. Possibilities of this
change of $2 \Delta/kT_c$ with pressure at first

investigations of the energy gap in

Technique

tes

obtained on superconductor-barrier-
superconducting diodes useful for
films investigated the best are pairs
conductor.

d by deposition in high (1×10^{-6} Torr)
glass slide 4×16 mm². There were
0.1, 0.11 mm² (Fig. 1). To avoid edge
films supported by an electromagnet.

their use in pressure measurements
oxidation conditions of the Al film.

U-vaporizer. During deposition the
primary long annealing (up to vacuum

Oxidation took place in the atmos-
for 5 min. Sample preparation was

measurements both during deposition
temperatures. Junctions with resistance

were covered with Si monoxide of
thickness was determined by Linnick's

to (1000 ± 100) Å. For Tl films

0 Ω mm², and their initial critical

Sample and obturator. 1 Sample holder made of
contacts, 3 Al film, 4 In and Tl films, 5 cover
glass, 6 obturator, 7 electrical wires

2.2 High pressure technique

A high pressure bomb with kerosene-oil mixture [8] was used in all investi-
gations. Pressure was created at room temperature and controlled by a hydraulic
pressure manometer. Here an almost linear change of tunnel junction resistance
(e.g. for $R(0) = 100 \Omega$, $dR/dp = 6 \Omega/\text{katm}$) was a reliable indication. Sensiti-
vity of junction resistance to pressures gave the possibility of rejecting samples
before immersing into liquid helium. The final pressure in the bomb at low
temperatures was calculated from T_c changes of an In wire [9]:

$$T_c = 4.36 \times 10^{-5} p + 5.2 \times 10^{-10} p^2.$$

20 electrical conductors were introduced into the obturator, this allowed mea-
surements to be carried out simultaneously, by means of a 4-probe system,
of the critical temperature of films, the In wire, and corresponding tunnel
characteristics.

2.3 Cryogenics and measuring apparatus

Low temperature measurements were carried out in a metal cryostat where
it was possible to get temperatures from 4.2 to 1.15 °K. The bomb with samples
was in liquid helium.

During the experiments the voltage-current characteristic was measured both
at constant voltage and constant current conditions. Depending on the con-
dition dI/dU or $(dU/dI)-U$ at a modulation frequency of 383 Hz were plotted.

All tunnel characteristics were recorded automatically on a X-Y coordinate
EPP-09-type register. Constant voltage at a sample was measured by a high-
ohmic potentiometer to within $\approx 1 \mu\text{V}$ during recording.

3. Results and Discussion

Indium: After preparation Al-I-In samples were annealed for some days
at room temperature. The critical temperature of In films practically did not
differ from T_c^0 for massive pure indium. The halfwidth of the superconducting
junction did not exceed 0.01 °K for all pressures. Table 1 gives the change of
critical temperature for the film which is found to be

$$\frac{dT_c}{dp} = - (3.65 \pm 0.15) \times 10^{-5} \frac{^\circ\text{K}}{\text{atm}},$$

Table 1
 T_c and 2Δ of indium under pressure

p (katm)	T_c (± 0.01 °K)	$t = \frac{T}{T_c}$	$2 \Delta(p, t)$ (± 0.01 meV)	$2 \Delta/kT_c$ (p, t)	$2 \Delta(p, 0)$ (meV)	$2 \Delta/kT_c$ ($p, 0$)
0	3.42	0.342	1.090	3.69	1.09	3.69
5	3.23	0.36	1.01	3.63	1.02	3.66
7	3.15	0.372	0.982	3.62	0.99	3.64
7.9	3.13	0.374	0.974	3.61	0.98	3.64
10.5	3.03	0.387	0.930	3.57	0.94	3.60
14	2.91	0.4	0.880	3.51	0.89	3.55