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A. Fournel [a] , B. Oujia [a] & J. P. Sorbier [a]
[a] Département Electronique, Université de Provence, 13397, MARSEILLE CEDEX, 13
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Tunneling Spectra in $(TMTSF)_2 ClO_4$ /I/Pb Junctions

A. FOURNEL, B. OUJIA, J.P. SORBIER.

Département d'Electronique, Université de Provence
13397 MARSEILLE CEDEX 13

All energy gap or partial condensation (pseudogap) which spread on a small energy range, around Fermi level, for an unknown material X, should be studied at low temperature by using tunneling junction as X/I/Pb.

Unlike experimental tunneling effect it present very often various anomalous zero bias, that is why we use Pb as conterelectrode. When lead is in a superconductive state we postulated that if tunneling spectra exhibits clearly the superconductive gap, and the phonon electron interactions we have a good tunneling device.

We show 3 cases of tunneling spectra, respectively by figures 1, 2 and 3, obtained with $(TMTSF)_2 ClO_4$ /I/Pb junctions. With our precedent criterion, only the case described by figure 3 is correct because superconductive gap is clearly observed. We may add that the ratio of dV/dI (V=0) by dV/dI (high energy) is lightly higher than 6 at 4.2 K (8 theoritically). We can observe by a decreasing of temperature from 4.2 K to 1.2 K a broadening of lead superconductive gap and figure 4 shows unambiguously the phonon-electrons interactions. This broadening effect is not observed in figure 1 and we may add that phonon-electron is not observed and that the value of the gap is only the gap of lead. In figure 2, we measure a superconductive gap larger than figure 1, the phenon-electron interaction is not very good but visible and when a magnetic field is applied a structure subsists. In figure 3 by applying a magnetic field a structure stay in place but this structure depends lightly on magnetic field (see insert in figure 3).

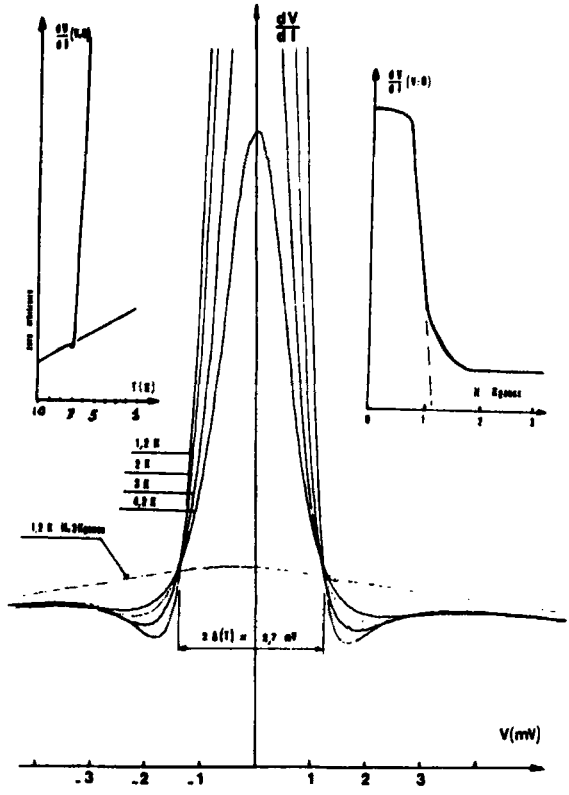

Figure 1 : case 1 is illustrated by these curves. $(TMTSF)_2$-ClO_4 have a metal comportment. The right insert shows that with a magnetic field up to 1.5 Kgauss, all the lead superconductivity is destroyed.

The structure observed in figure 3 could have for reason a partial condensation created by the existence of superconductive fluctuatives domains (1). At 1.2 K this condensation would be important (25 % according to our curves). These results are in contradiction with those of ISHIGURO (see proceedings of this

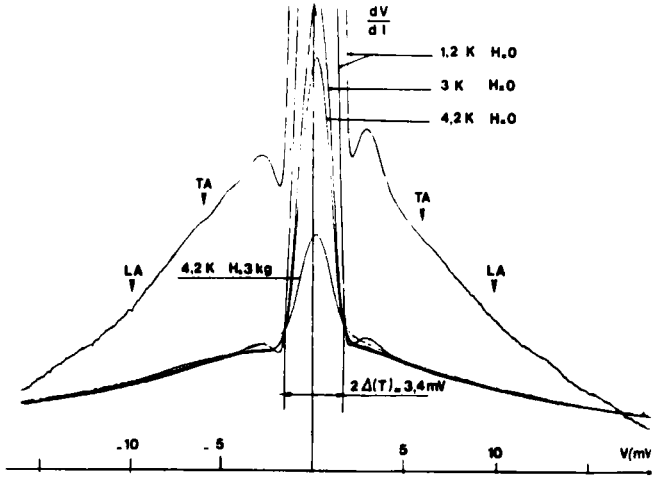

Figure 2 : Case 2. Phonon-electron interactions are lightly visible. TA and LA indicate the energies of lead phonons measured with AsGa/Pb junctions.

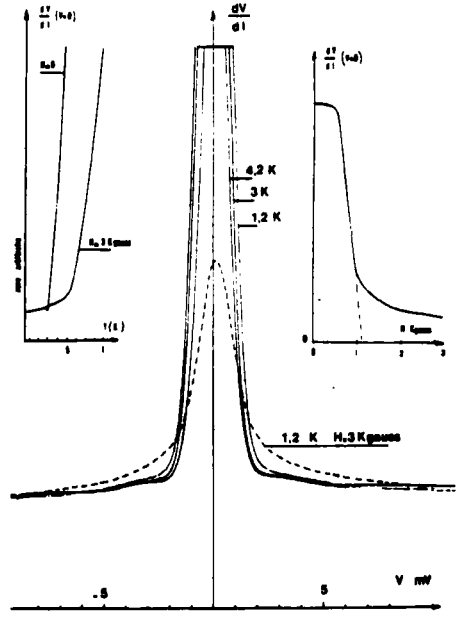

Figure 3 :

The broadening of lead gap when temperature is decreasing is clearly observed and the singularities of adges gap are rubbed.

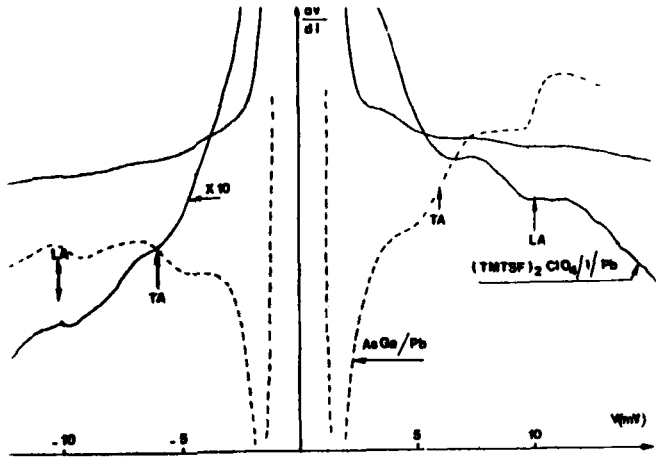

Figure 4 : Case 3. The phonon-electron interactions are clearly observed and compared with the one obtained in AsGa/Pb junctions.

conference) but their spectra obtained with $(TMTSF)_2\ ClO_4$/I/Pb junctions don't show the lead phonon-electron interaction ; the fine effects caused by $(TMTSF)_2\ ClO_4$ could be hidden.

More details of our work are given in a paper that will be published in Journal de Physique Lettres.

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