

Compound (solvent)	Concentr. $10^{-4} M$	R'	R''	$W_{thr} J$	$\lambda_{gen} nm$
Paraterphenyl (cyclohexane)	13	0,9	0,85	2,5	341
Paraterphenyl (cyclohexane)	-	0,9	window* of cell	3,5	-
Paraterphenyl (cyclohexane)	-	0,9	window of cell	5,0	-
Paraterphenyl (cyclohexane)	-	0,9	grating 1200 lines/mm	6 - 10	330 - 350
Paraterphenyl (cyclohexane)	-	0,9	grating 200 lines/mm	6 - 10	336 - 341
Paraterphenyl (ethanol)	10	0,9	0,85	3,0	341
POPOP (cyclohexane)	5	0,97	0,89	4,5	-
POPOP (cyclohexane)	-	0,97	window of cell	8,0	-
Rhodamine-6G (ethanol)	1	0,97	window of cell	< 1,5	-

* In this case the generation energy was about $10^{-3} J$ at a pump energy 10 J.

The threshold pump values and the generation tuning range are given in the table. When the first grating was used, several lines were simultaneously excited at certain grating angles; only one line with width 2 Å was obtained with the second grating.

The low solution-excitation threshold energies listed in the table indicate that such a pumping system is effective for the excitation of a large number of other organic compounds.

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ELECTRIC PROPERTIES OF LINEAR CONDUCTING CHAINS OF Pt ATOMS IN $K_2Pt(CN)_4Br_{0.3} \cdot 2.3 H_2O$

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Little's well-known idea [1] that a nonphonon mechanism of superconductivity is possible in one-dimensional conducting systems has recently stimulated interest in the study of the properties of such systems. One example of such a compound with a quasi-one-dimensional conductivity are complexes of tetracyanquinodimethane [2, 3]. Another example are the so-called

plane-quadratic complexes of transition metals with metal-metal bonding [4], which include, in particular, the complex platinum salt with composition $K_2Pt(CN)_4Br_{0.3} \cdot 2.3 H_2O$.

A characteristic feature of the crystal structure of this salt is the presence of linear stacks made up of squares containing Pt atoms in their centers and CN groups at their vertices [5]. All the Pt atoms in the stack are equivalent and the distance between them is 2.89 Å, although formally, from the chemical point of view, approximately five out of every six atoms are in the divalent state, Pt^{2+} , and one is in the tetravalent state, Pt^{4+} , owing to oxidation by the bromine. This equalization of the interatomic distances for a formally non-equivalent electronic structure of the atoms in the chain indicates that, at least at room temperature, the outermost electrons of the platinum are shared to a considerable degree. The extent of this sharing, however, cannot be determined from structural data alone.

The conductivity of single-crystal $K_2Pt(CN)_4Br_{0.3} \cdot 2.3 H_2O$ at room temperature was first measured by Krogmann [5], who found that $\sigma_{room} = 10^{-3} \text{ ohm}^{-1} \text{ cm}^{-1}$. Recently Mainot and Perlstein (private communication to V. L. Ginzburg) reported that more accurate measurements yield $\sigma_{room} = 4 \text{ ohm}^{-1} \text{ cm}^{-1}$ and proposed that one-dimensional conductivity of the metallic type is involved here. We wish to report results of the measurement of the temperature dependence of the conductivity of single crystals of $K_2Pt(CN)_4Br_{0.3} \cdot 2 H_2O$ in direct current and at 10^{10} Hz, which show that although actually the room-temperature conductivity is higher by two orders of magnitude than reported by Mainot and Perlstein, the electronic system of the linear chain of Pt atoms is not metallic.

The DC measurements were made by a four-contact method using aquadag contacts. The procedure for the measurements at 10^{10} Hz has been described in [6]. The results of these measurements are shown in Fig. 1. At high temperatures, approximately up to 100°K, the conductivity is independent of the frequency, within the limits of measurement accuracy, and its room value is $(3.5 \pm 0.5) \times 10^2 \text{ ohm}^{-1} \text{ cm}^{-1}$. With further cooling, the DC conductivity drops much more rapidly than the HF conductivity, the fall-off in both cases being close to exponential. The low-temperature activation energy is $800 \pm 50^\circ K$ and $160 \pm 15^\circ K$ at DC and HF, respectively.

The crystals of the investigated complex have the form of needles with a characteristic copper sheen. We have observed that not all crystals are equally suitable for measurement. The largest of them, with transverse dimensions on the order of 0.2 - 0.3 mm, grow as a rule

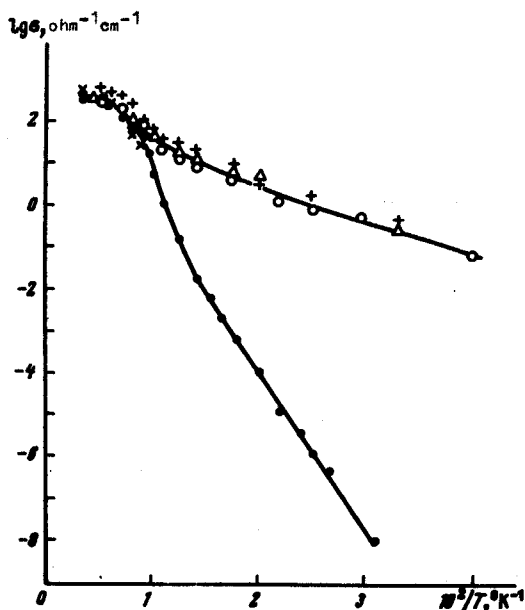


Fig. 1. Temperature dependence of the conductivity of the complex $K_2Pt(CN)_4Br_{0.3} \cdot 2.3H_2O$: ● - direct current; ○, △, +, × - different crystals at frequency 10^{10} Hz.

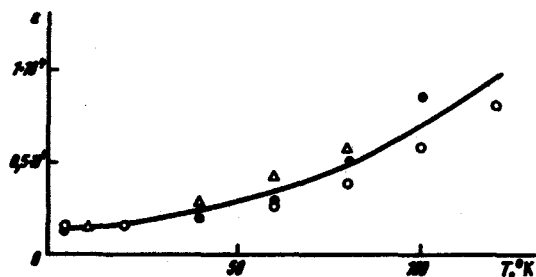


Fig. 2. Temperature dependence of the dielectric constant of the complex $K_2Pt(CN)_4Br_{2.3} \cdot 2.3H_2O$ at 10^{10} Hz. Different symbols stand for measurements on different crystals.

10^{10} Hz (Fig. 2). At helium temperatures $\epsilon = (1.2 \pm 0.2) \times 10^3$ and increases with increasing temperature. Measurement above $100^\circ K$ becomes impossible because of the high conductivity of the crystals.

The described behavior of the complex $K_2Pt(CN)_4Br_{0.3} \cdot 2 H_2O$ is perfectly analogous to the behavior of the highly conductive complexes of tetracyanquinodimethane [2, 3]. We can thus conclude that the conductivity of this compound has more readily a diffusion character, and that the system of electrons of the linear chain of Pt atoms does not form bands and is thus metallic. The large value of the dielectric constant at low temperatures is apparently connected somehow with the observed large dispersion of the conductivity, but the mechanism of its occurrence is not clear at present.

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INFRARED QUENCHING OF THE PHOTOPLASTIC EFFECT IN CADMIUM SULFIDE

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We have previously reported [1] observatio of a new effect in CdS, called by us the photoplastic effect (PPE). The effect consisted in a strong increase of the resistance of the crystal to plastic deformation under the action of light of a wavelength close to the edge of the intrinsic absorption. We subsequently succeeded in observing this effect also in zinc selenide, where the magnitude of the effect reached 100% of the initial stress. The PPE was later observed in ZnO Crystals [2].

We report here observation of infrared quenching of the photoplastic effect.