sec. Fast photographic techniques have also been used⁷ to get short-term velocities of the order of 2.5 km./sec. This communication is to present some cases of instantaneous motions recorded photo-electrically and confirmed by simultaneous visual observations. The device is a double photometer system used earlier⁸⁻⁹ collecting light from two fields each 0.55° in size and separated from each other by 3°. Observations were made separately for two orientations of the field-pair, one at 90° to the other. Signals were recorded using a two-channel Sanborn recorder at a chart speed of 10 mm./sec.

Figs. 1-3 show signals from bright moving bands as visually observed at the time of recording. The intensity in each case was easily about 100 kilo rayleighs or more. A time-lag is seen in one of the two channels between corresponding signal events. This time-delay, which is indicative of motion of the auroral form across the two fields of view, seems to vary from 1.5 to 2.5 sec. The delay may be seen in any one of the two channels. This is perhaps a matter of speed and direction at transit across the two fields. Assuming the auroral height as 100 km. the speeds obtained range from 4 to 10 km./sec. These are, however, components in the direction of motion. Furthermore, only when the orientation of the field-pair is in the direction of motion of the auroral form could this kind of a time-delay in one channel be seen.

The double-peak feature in Fig. 1 with a drop in the signal level in between in each channel is intriguing. Probably, this could be due to two independent auroral patches moving in succession. The widths of the peaks in one channel seem to be reversed relative to those in the other. The moving form may not be steady in speed, size or intensity during its passage across a field of view; particularly so across two fields of view.

The high speeds mentioned here obtained over a few seconds could perhaps be distinguished from the usual drift motions observed from all-sky records. Dzordzhio in the U.S.S.R. has obtained¹⁰ by photo-electric methods speeds of the order of 9 km./sec. and mentions also speeds of 3-4 km./sec. by visual estimates due to Galperin.

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Temperature Coefficient of Electrical Resistance of High-Purity Rhodium

I SUPPORT Price and Taylor¹ in believing that the temperature coefficient of resistance of rhodium is appreciably higher than 0.00457, the maximum value hitherto recorded in the literature.

As long ago as 1936, measurements made by the National Physical Laboratory on a sample of rhodium

specially purified in our refineries indicated a value of 0.00463, confirming exactly the higher value now quoted by the above authors; and since then this value has been widely used in our own organization.

It is to be hoped that the higher value will now be generally recognized.

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Sputtered III-V Intermetallic Films

IN the course of investigating methods for the deposition of films of semi-conductive materials, it was found that the antimonides of indium and gallium can be readily deposited by means of cathodic sputtering. Reactive sputtering has been widely used for several decades for formation of films of oxides and certain other compounds¹; but there seems to have been little interest in the direct sputtering of compound materials. Kane and Wood attempted to produce a sputtered film of Ag₂Te, but obtained rather Ag_{3-x}Te (ref. 2). Recently, work concerned with sputtering yields for gallium antimonide³ and directional patterns formed by sputtering from single crystal balls of indium antimonide has been reported⁴, but in neither case were properties of the films discussed.

The apparatus used was similar to that described by Belser and Hicklin⁵. The substrate holder was adjustable in height relative to the suspended source and fitted with a small tantalum wire heater for controlling the temperature of the substrates. Films were deposited on 1-in.² substrates of fused silica or an aluminosilicate glass (Code 1723, Corning Glass Works). Prior to deposition, the substrates were thoroughly degassed in vacuum (about 10⁻⁵ mm mercury) at elevated temperatures. The system was purged with dry argon (99.996 per cent minimum purity), which was also used as the bombarding gas for sputtering. Pressures during sputtering were in the range of approximately 50-150μ mercury. Sputtering was carried out at potentials of 2-4 kV

Table 1. PROPERTIES OF SPUTTERED INSb AND GASb FILMS

Sample No.	Approximate substrate temperature (°C.)	Film thickness (Å)	Resistivity (ohm-cm)	Carrier type	Hall mobility (cm ² /V-sec)
InSb					
(Source I)*	—	—	1.9	n	65,000
2	175	72,000	2.0	n	28
5	175	12,000	0.26	n	110
6	225	1,300	0.002	n	21
10	160	11,000	0.016	n	160
(Source II)†	—	—	0.005	n	72,000
13	50	5,400	9.4	n	—
14	100	11,000	0.79	n	9.5
15	250	4,000	0.015	n	460
16	200	4,300	0.14	n	110
17	150	4,300	0.19	n	26
GaSb					
(Source I)‡	—	—	0.78	p	—
1	< 400	1,900	0.61	p	2.4
2	315	1,100	0.61	p	1.9
9	60	5,400	1,300	p	—
10	110	8,000	8,000	-	—
11	175	3,100	0.90	p	—
13	320	4,000	2.6	p	—
14	300	1,100	0.25	p	1.5
15	200	1,300	300	p	—
(Source II)§	—	—	0.10	p	—
16	350	4,300	0.24	p	7.5
18	300	4,300	5.3	p	—

* Supplied by Ohio Semiconductors, Inc.

† Supplied by Cominco Products, Inc.

‡ Supplied by Alpha Metals, Inc.

§ Supplied by Micro State Electronics Corp.