COMMUNICATIONS

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ed appreciably the evels of generationrt lifetime of excess o observed in bulk

t at room temperab and InAs, Fig. 1. tandard filters and a holder containing dry ambient. To ts the current noise otal noise power to ples were prepared ise measurements.8 three-temperature llv used for Hallthat the currentsurements without ole I are given the limensions of the l mobilities.

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nSb and InAs.

TABLE I. Dimensions and physical characteristics of the specimens.

Sample	Direct current through sample (mÅ)	Length (mm)	Width (mm)	Thick- ness (microns)	Hall coeffi- cient (cm ³ /C)	Resis- tivity (Ω-cm)	Hall mobility (cm ² /V sec)
InSb (flash evapo- rated)	3	7.5	1.2	3.0	220	3.7×10 ^{−2}	6000
InAs (flash evapo- rated)	5	7.5	1.1	0.3	5	5×10 ⁻³	1000
InSb (three- tempera- ture method)	10	6.5	2.4	1.5	145	1.3×10-2	11 200

effective surface-to-volume ratio affects the level of 1/f noise.¹⁰ Hence, the presence of 1/f noise in evaporated films of InSb and InAs may be related to their large effective surface-to-volume ratios which far exceed those obtained in specimens made of bulk material. On the other hand, comparison of the noise levels in Fig. 1 with the data in Table I indicates that the effective surfaceto-volume ratio cannot completely account for the noise. The generation of 1/f noise is known to depend on many other factors such as surface conditions (i.e., inverted layers) or grain boundaries in the material. It is of interest to note, however, that the many possible causes of the noise generation notwithstanding the noise spectra in Fig. 1 do follow exactly the 1/f pattern.

The specimens of InSb and InAs fabricated by flash evaporation were prepared by K. K. W. Heid of Beckman Instruments, Inc., while the sample of InSb made by utilizing the three-temperature method was obtained from the Naval Ordnance Laboratory Corona, courtesy of H. H. Wieder.

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Residual Strains in Shock-Loaded Aluminum

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I N a previous paper¹ it was reported that apparent large reverse flow stresses were observed upon unloading of aluminum samples which had been shock loaded to stress levels of 100 and 175 kbars. The purpose of this communication is to report some recent measurements of residual strains in aluminum samples which have been exposed to similar loading-unloading histories. These measurements agree with the values predicted by quasistatic, rate-independent, elastic-plastic theory,² and thus indicate that the observed large flow stresses are transient phenomena. Some preliminary results of this work have been presented elsewhere.3

The zero stress point on the uniaxial strain unloading curve of a shock-loaded aluminum alloy (composition: 93.75% Al, 4.25% Cu, 0.50% Mg, 0.75% Mn, 0.75% Si; tensile yield strength

(0.2% offset): 3.95 kbars; Young, and the fat there & deers hardness: 134) was determined by these of g the trend as strain after shock loading. The experiments are use at the trace of Hartman.4 The essential difference is that on the ground work explosive loading was used in order to of the second at the expression of 110 and 240 kbars, whereas Hartman a sone and a gas gap to obtain pressures below 40 kbars.

The experimental arrangement for producer a last bar slock wave consists of a "mouse-trap" place and proven a which causes a 1.5-mm aluminum plate to the discount a second structure that a 3-mm-layer of "Metabel" (supplier: Internal Concern) Industries) sheet explosive covering a 1.5 mm at and the fact plate. The flyer plate is accelerated actives a ferror gap and strates the target plate arrangement, which consists of a stark of three plates in intimate contact.

The 110-kbar shock wave is produced in the target by removing the flyer plate and sheet explosive so that the measure trap plate strikes the target arrangement directly.

The first target plate is 1.5 mm thick and the other two plates are 7 mm thick. The diameter of the plates is 10 error The last two plates both have cylindrical samples 10 mm in damater presed snugly into holes bored in their centers. The plane shock wave generated by the impact passes through the three plates and reflects from the free surface. The two exheaders algorithms are accelerated through windows cut in wooden plates and through layers of styrofoam and foam rubber before land stepped in a water tank. They are recovered from the water tank after the shot. The wooden plates serve to retard and deflect the alandmum helder plates.

The dimensions of the aluminum plates are elissen so that the pellets are loaded and unloaded in the direction of the cylinder axis before relief waves from the edges arrive and destroy the onedimensional nature of the strain. The history of the scouple in the middle plate is that it is first shock loaded, and then releved by means of the rarefaction fan from the year of the duct plate. This sample does not experience tension. The pellet in the last plate, on the other hand, undergoes tension due to the intersection of relief waves from the front and the tear of the target arrangement, and this pellet was always found upon recovery to have spalled.

The thickness of the sample from the middle plate is measured before and after each shot. The shock pre-ares undaced in the samples are obtained from auxiliary experiments in which electronic pin switches are used to measure the free surface velocity of the middle plate in the absence of the last plate. Known Hugoniot equation-of-state data' are than used to obtain the pressure and density initially present behand the shock wave. The analysis of the residual strain measurement as identical to that described by Hartman.⁴ The strain rates present upon unloading depend on the unknown time history of the unlowlong stress strain curve. However, the rates can be estimated from rate independent theory to be of the order of 3×10^{5} sec ⁴

The measured residual strains as a function of clock stress are plotted in Fig. 1. Hartman's experimental data and the theoretical curves based on rate-independent clastic plastic theory are also shown for comparison. The theoretical curve in Fig. 1 was con-



FIG. 1. Measured residual strains as a function of slock stress.

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