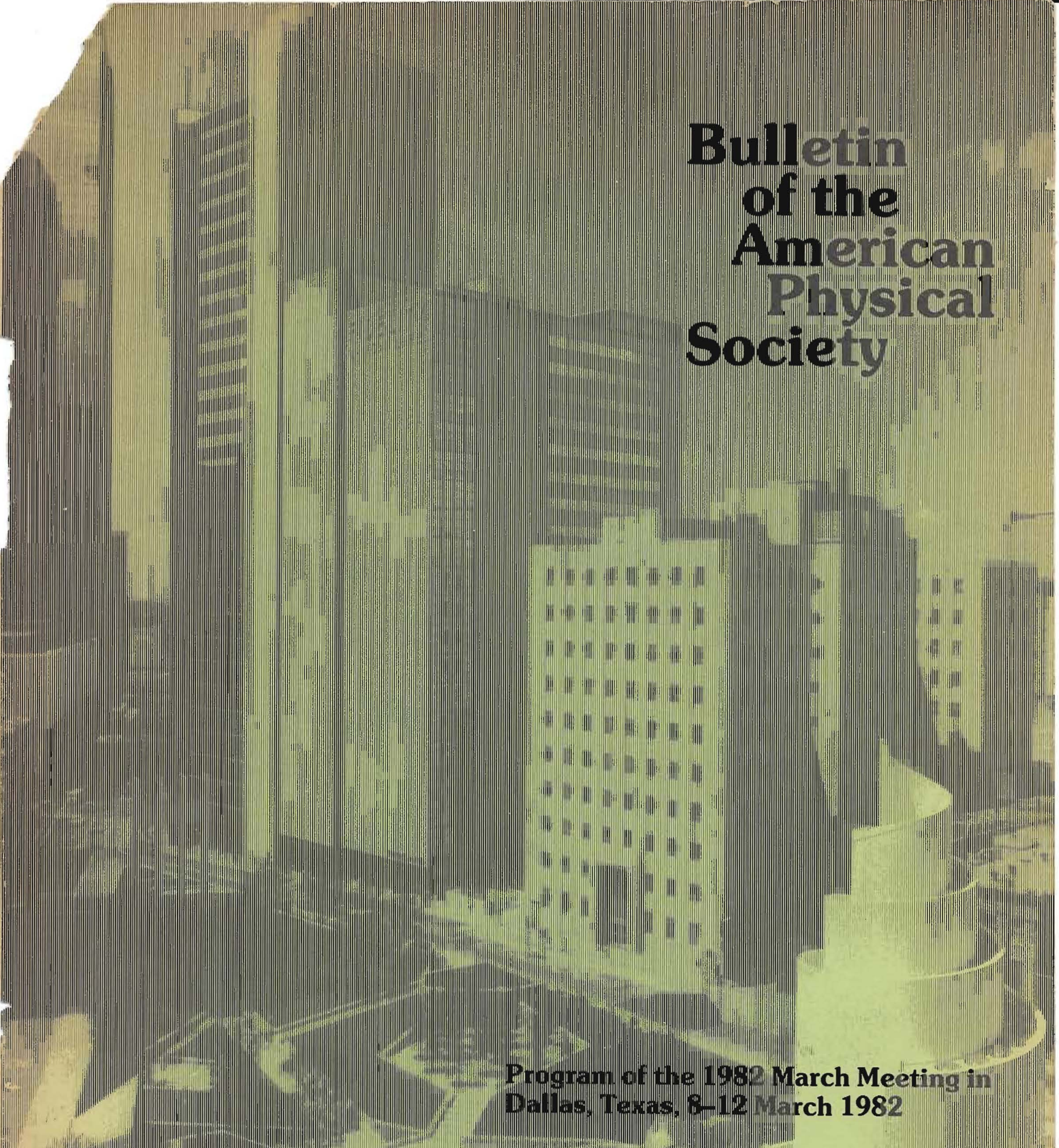

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large $N(E_F) \approx 2.1$ states/eV, but is easily weakened or destroyed by local moments which may form due to intermixing.

†Work supported by the U. S. Department of Energy.
[1]R. E. Thomas and G. A. Haas, J. Appl. Phys. 43, 4900 (1972).

DJ 11 Experimental Study of 1/f Noise in Tin.* D. M. FLEETWOOD and N. GIORDANO,† Purdue University.--The 1/f noise of tin films at room temperature has been studied. The magnitude of the noise depended upon the type of substrate used and the strength of the adhesion between the film and its substrate. This is in contrast to previous experiments on other materials in which it was found that the noise was either substrate independent, or that such a dependence was present only well below room temperature.[1] The noise was nearly two orders of magnitude below that observed by previous workers and predicted by the thermal fluctuation model;[2] however, these results are consistent with the ideas underlying the thermal fluctuation model. It is not clear how our findings may be reconciled with the results of recent experiments[1,3] which appear to be inconsistent with this model.

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†Alfred P. Sloan Foundation Research Fellow.
[1]P. Dutta and P.M. Horn, Rev. Mod. Phys. 53, 497 (1981).
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[3]J.H. Scofield, D.H. Darling, and W.W. Webb, Phys. Rev. B (November, 1981); R.D. Black, M.B. Weissman, and F.M. Fliegle, Phys. Rev. B (November, 1981).

DJ 12 An In-Situ X-ray Study of Phase Formation In Copper-Aluminum Thin-Film Couples. J. M. VANDENBERG and R. A. HAMM, Bell Laboratories.-- The phase formation in copper-aluminum thin-film couples is studied by X-ray analysis during in-situ annealing in the temperature range 35-500°C. After the first nucleation of $CuAl_2$, the fcc-ordered phase β-Cu_3Al forms subsequently indicating a two-step nucleation reaction. The formation of transient phases and end phases is discussed. In the transient stage of the reaction, the phase β-Cu_3Al transforms into a new phase β' with a hexagonal superlattice. X-ray data of both phases are presented. The formation of the end phases is compared with the previously studied Au-Al thin-film system.[1] In both the Cu-rich- and Au-rich thin-film systems the terminal solid solutions, αCu and αAu resp., form at temperatures greater than 300°C at the expense of the Au- and Cu-richest compounds.[2]

1. J. M. Vandenberg and R. A. Hamm, J. Vac. Sci. Technol., 19, 84 (1981).
2. J. M. Vandenberg, F. J. A. den Broeder and R. A. Hamm, 1981 Annual Meeting MRS, Nov. 16-19, Boston.

DJ 13 Structural and Magnetic Properties of Bias-Sputtered Pd-Films. P. ZIEMANN, E. KAY and J.C. SCOTT, IBM Research Lab.--Pd-films (thickness between 200nm and 800nm) have been prepared using a triode-sputtering technique at low Kr on Ar pressures (1 mtorr). During film growth the samples are bombarded by low energy (100-500eV) Kr or Ar ions (bias-sputtered). Due to this bombardment the films show systematic changes of material parameters, e.g., residual resistivity, preferential orientation of the 111-direction perpendicular to the film surface, lattice dilation up to 0.6%. Magnetic measurements show an enhancement of the low temperature susceptibility over that of unexpanded Pd. The correlation of the physical properties with sputter parameters will be presented.

DJ 14 Magnetoresistance of Thin Bismuth Films.* J.S. BROOKS, G.O.ZIMMERMAN, and J. SZEP, Boston Univ.,** R. MESERVEY and P.M. TEDROW, Francis Bitter National Magnet Laboratory,+ M.I.T.—The longitudinal and transverse magnetoresistance of bismuth films ranging in thickness from 0.01 to 2 μm has been measured at liquid helium temperatures and in magnetic fields up to 19 T. The films are produced by vapor deposition of pure bismuth onto a glass substrate held at liquid nitrogen temperature. The transverse magnetoresistance has an H^2 dependence for $H < 1$ T, but saturates at high fields. The longitudinal magnetoresistance also shows a low field H^2 dependence, but in films in the range 0.04 to 1.3 μm a maximum in the resistance is observed. A comparison of the field dependence of this maximum with theoretical predictions will be discussed.

*Submitted by R. Meservey.
**,+Supported by the National Science Foundation.

DJ 15 Electrical Resistivity of Metallic Thin Films with Random Rough Surfaces. K.M. LEUNG, U. of California-Santa Barbara.* -- The problem of finding the wavefunction of a free electron which is confined within a region bounded by surfaces of arbitrary shapes can be transformed , using non-conformal mappings, to the corresponding problem of an electron bounded by smooth surfaces. In the new coordinate system, the electron, which is of course no longer free, experiences an effective potential and also acquires an effective mass. For metallic thin films, the electron wavefunction is computed explicitly in the small roughness limit. The resulting wavefunction is then used to calculate the electrical resistivity of metallic thin films with random rough surfaces and static random impurities. The contribution due to the scattering of conduction electrons from the surfaces is identified.

*Research supported b- NSF grant DMR-80-08004.

DJ 16 Growth and Interfacial Microstructure of Single Crystal $CoSi_2$ Thin Films on Si(111). R.T. TUNG, J.M. GIBSON, J.C. BEAN and J.M. POATE, Bell Labs, Murray Hill, NJ - We have grown epitaxial $CoSi_2$ films on Si (111) which have several unique features. Firstly, these are truly single-crystalline metallic films in intimate contact with semiconductor substrates where the interface is locally flat and well-defined to interatomic dimensions. Secondly, despite the fact that both $CoSi_2$ and Si have cubic structures (matched within 2%), the silicide overgrowth is found to be rotated 180° about ⟨111⟩ with respect to the Si substrate. Electrical conductivity in these silicide films is considerably higher than reported for poly crystalline layers. Furthermore, Si films can be grown on this silicide yielding 'buried' thin metal layers. We will illustrate these findings with RBS & channeling, TEM and LEED data. Comparison can be drawn between $CoSi_2$ and $NiSi_2$: the latter, although having identical structure to $CoSi_2$ and a substantially smaller mismatch with Si, cannot be grown single-crystalline on Si (111). A model of the silicide growth process which explains this unexpected behavior, along with a model for the atomic interface structure obtained from high resolution transmission electron micrographs will be presented.

SESSION DK: SEMICONDUCTOR INTERFACES, SURFACES, FILMS

Tuesday morning, 9 March 1982
Terrace Room, Fairmont Hotel at 9:00 A.M.
G. F. Neumark, presiding

DK 1 Schottky Barrier Formation at UHV-Cleaved InP-Metal Interfaces. L.J. Brillson†, A. Katnani, and G. Margaritondo, †Xerox Corporation, Webster Research Center, Webster, New York 14580, Dept. of Physics, University of Wisconsin, Madison, WI, 53706. Soft X-ray photoemission spectroscopy (SXPS) has been used to probe the chemical and electronic