stellar dust could be formed in astrophysical conditions.

There are two important problems which must be solved before we can say that diamonds definitely exist in interstellar dust. First, it will be necessary to compute detailed Mie extinction curves for various particle distribution functions. For this the ultraviolet absorption coefficient must be measured accurately beyond ~ 2100 Å (ref. 13). Second, it is necessary to understand the polarization properties of diamonds and whether anisotropic crystals can be formed through the effects of impurities or anisotropic pressures. The unusual phenomenological theory of nucleation is unlikely to be helpful here because kinetic effects dominate. Both these problems are further complicated by the solid-state effects on diamond of ultraviolet, electron and cosmic ray bombardment.

We hope that this report will stimulate inquiry into these problems and lead to a more thorough study of the astrophysical properties of diamonds and the mechanisms of their formation.

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WILLIAM C. SASLAW
JOHN E. GAUSTAD

Department of Astronomy,
University of California,
Berkeley, California.

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- ¹ Stecher, T. P., and Donn, B., *Ap. J.*, **142**, 1681 (1965).
- ² Cudaback, D. D., Gaustad, J. E., and Knacke, R. F., *Bull. Amer. Astro. Soc.* (in the press).
- ³ Witt, A. N., *Ap. J.*, **152**, 59 (1968).
- ⁴ Clark, D. C., Ditchburn, R. W., and Dyer, H. B., *Proc. Roy. Soc., A*, **234**, 863 (1956).
- ⁵ Charette, J., *Proc. Intern. Cong. Diamonds Ind.* (Paris, 1962).
- ⁶ Gillett, F. C., Low, F. J., and Stein, W. A., *Ap. J.*, **154**, 677 (1968).
- ⁷ Hulst, H. C. van de, *Light Scattering by Small Particles*, 152 (John Wiley, 1957).
- ⁸ Hulst, H. C. van de, *Light Scattering by Small Particles*, 178 (John Wiley, 1957).
- ⁹ Wood, J. A., *The Solar System* (edit. by Kuiper, G. P.), **4**, 389 (Univ. Chicago Press, Chicago, 1963).
- ¹⁰ O'Dell, C. R., Hubbard, W. R., and Peimbert, M., *Ap. J.*, **143**, 743 (1966).
- ¹¹ Brewer, L., and Mastick, D., *Univ. Calif. Radiat. Lab. Rep. No. 572* (1949).
- ¹² Angus, J. C., Will, H. A., and Stanko, W. S., *J. Appl. Phys.*, **39**, 2915 (1968).
- ¹³ Clark, C. D., Dean, P. J., and Harris, P. V., *Proc. Roy. Soc., A*, **277**, 312 (1964).

Polarization-Albedo Relationship for Selected Lunar Regions

I HAVE tested the accepted theory that there is a strong inverse relationship between brightness and polarization on the lunar surface, by measuring the polarization of several examples of "pure" maria (dark and light), highlands and mountains in five passbands with a photoelectric Wollaston polarimeter. The effective central wavelengths were 3360 Å, 3640 Å, 3830 Å, 4500 Å and 5340 Å and the bandwidths (half-response points) ranged from 330 to 560 Å. The short wavelengths are uncertain (± 30 Å) because of unknown atmospheric extinction. Observations of the 30 s of arc diameter regions were made within a sufficiently short period of time during each observing session that the lunar phase angle (-107°)

Table 1. LUNAR REGIONS OBSERVED AND AVERAGE POLARIZATIONS BY TYPE

Topographic type	Selenographic		Average polarizations	
	Longitude	Latitude	5340 Å (per cent)	3360 Å (per cent)
Dark maria	+24°	+17°	15.6	30
	+28	+26.5		
Light maria	+26	+21.5	13.5	26
	+19	+25.5		
Mountains	+18.5	+39	8	14.5
	+4.5	+48		
Highlands	+21	-23.5	6.6	12
	+6.5	-22

Fig. 1. Normalized values of the average polarizations of the lunar regions studied showing the different dependences on wavelength for the topographical types.

did not change by more than $\pm 1.5^\circ$. The probable error was ± 0.06 per cent in polarization. The observations were made on June 14, 1967, and May 4, 1968, UT. Some of the regions were measured on both dates.

The average polarization values of the topographical types at the two extreme wavelength bands are shown in Table 1, which also gives the coordinates of the regions. The darker and lighter maria show approximately twice the polarization to that shown by the mountains and the highlands respectively. The difference in polarization of 2.5 per cent between highlands and mountains was not expected, for their albedoes are almost indistinguishable.

The influence of albedo on the polarization was removed by normalizing the light maria, the highlands and the mountains to the observed values for dark maria at the longest wavelength (5340 Å). The normalized curves depart from one another and from the dark maria by amounts which increase as the short wavelengths are approached (Fig. 1).

Other examples of these topographical types were measured at other phase angles and the same trends were found.

These data suggest that there are differences in the mean internal optical pathlength of the particles that cover the different topographies. The mean internal optical pathlength is a function of the effective refractive index (wavelength) and the particle size. Furthermore, the relative magnitude of external scattering between the particles compared with internal pathlengths might differ on the topographic types.

S. F. PELLICORI

Lunar and Planetary Laboratory,
University of Arizona,
Tucson, Arizona.

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Generation of Seismic Anisotropy in the Upper Mantle along the Mid-Oceanic Ridges

HESS¹ suggested that the uppermost mantle beneath the oceans might be seismically anisotropic as a result of a preferential orientation of its constituent olivine crystals. In support of his hypothesis he cited seismic refraction measurements by Raitt² in the region of the Mendocino fracture zone and by Shor³ in an area north of the Hawai-