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**Observation of Shock-Induced Failure of Diamond Particles using High-Speed Photography** GEOFF WILLMOTT, Physics and Chemistry of Solids Group, Cavendish Laboratory, Madingley Road, Cambridge, CB3 0HE, UK, FIELD JOHN, PCS GROUP TEAM — Failure of shocked diamond particles has been observed using high-speed photography with an exposure time of 50 ns and an interframe time of 100 ns. The diamonds, which were each embedded in a transparent polymethylmethacrylate matrix, were approximately discs of diameter $\sim$5 mm and thickness 1 - 2 mm. Shock waves were induced in plate impact experiments. Three broad categories of failure were observed in the first microsecond after shock wave arrival. Diamonds containing pre-existing weaknesses and birefringence at crystal centres were prone to comminution. These diamonds also developed large internal single fractures, which propagating at up to $14 \pm 1$ mm $\mu s^{-1}$, faster than the Rayleigh wave velocity. Smaller cracks observed near particle edges suggest that the flaws of dimensions up to at least 5 $\mu$m are present near unpolished diamond surfaces. The size distribution of fragments recovered from these experiments indicates that fractures interact with each

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