were recrystallized. Also only a few areas contain sulfide (FeS) surrounding the Fe-Ni. This observation is in contrast to the Apollo 11 samples where shock remelting was often observed.

Out of some 50g of lunar soil examined only seven isolated metal particles, > 0.1mm in size, were found. The majority of these particles are of meteoritic origin. Several lightly shocked (~ 100 kbar) kamacite particles as well as several remelted meteorite fragments were found. The fact that the Apollo 12 soil appears to have much smaller amounts of metal particles than does the Apollo 11 site, and that the metal particles are at most only lightly shocked, argues for a low flux of meteorite impacts at the Apollo 12 site.

## IRON METEORITE WIDMANSTATTEN PATTERN PRODUCED IN THE LABORATORY

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Experimental phase equilibria and kinetic studies have been performed using Fe-Ni-P alloy samples. These alloys were slow cooled in laboratory furnaces to temperatures between 750 and 500 °C. As a result of these experimental studies we have been able to simulate the structures formed in several different types of iron meteorites. We were able to produce kamacite during direct cooling of alloys of meteoritic composition containing as little as 0.1 wt% P. Kamacite nucleates initially at prior taenite grain boundaries with little or no undercooling. A Widmanstatten pattern was produced in many of these same alloys after undercooling 30 to more than 100 °C below the equilibrium nucleation temperature. This is the first report of a successful synthesis of the Widmanstatten pattern. We conclude that P is necessary in order to produce the Widmanstatten structure in iron meteorites.

The addition of increasing amounts of P promotes more rapid nucleation and effectively lowers the amount of undercooling necessary to form a Widmanstatten pattern. The effect of increases Ni in meteorites is exactly opposite to that of P. Other meteoritic structures produced in our laboratory studies were Brezina lamellae, swathing kamacite and oriented kamacite platelets which were nucleated on swathing kamacite. The effect of P on the cooling rate calculations for iron meteorites and pallasites appear to be small, that is within the factor of 2 error currently ascribed to the method.