Dust features and gas in debris disks

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Debris disks are gas-poor, optically thin circumstellar dust components around main-sequence stars. We found more than 50 debris disk candidates from AKARI 9 and 18 μm observations. About 20 of the disks may have dust features, which may come from dust much grains smaller than 10 μm. If all gas in the debris disk is depleted, the smaller dust grains than 10 μm are quickly blown out by stellar radiation pressure from the typical debiris-disk host star that is about 10 times more luminous than the sun (e.g., Burns et al. 1979). The dust features can be explained only by very recent dust production events, such as giant impacts that formed Earth-Moon system in the solar system. On the other hand, if gas exists with more than 10^{-17} g/cm^3, small dust can stay in the disks. We investigate the archive data of ALMA. We newly found CO gas in two debris disks. Taking into account the dust feature and the gas existence, we discuss the amount of hydrogen molecular, which is critically important for planet formation.