The evolution of silicate feature in protoplanetary disks

Batalla-Falcon, Grace A[1]., Cieza, Lucas A.[1], Zhang, Ke[2]
1 Universidad Diego Portales
2 University of Wisconsin-Madison

Silicate dust is a crucial component of protoplanetary disks, and plays an important role in the early stages of planet formation. As disks evolve, the silicate dust is influenced by several processes, such as thermal annealing, coagulation, fragmentation, radial drift and the filtering at the edges of planet-induced gaps and cavities. Here we present JWST-MIRI (5 - to 23 micron) spectra of 30 protoplanetary disks from different nearby molecular clouds. The sample was taken from the ALMA Large Program AGE-PRO and includes objects from three different molecular clouds with different mean ages: the Ophiuchus, Lupus, and Upper Sco clouds. Overall, the targets cover regions with different mean ages (< 1 Myr to 5 Myr) with a relatively narrow range of spectral types (between K6-M3), corresponding to stellar masses from 0.3 to 0.8 Msolar. We present preliminary results showing clear differences in the silicate features with age. In particular, we find the younger Class I sources (still embedded in their natal envelopes) show amorphous silicates in absorption, while the more evolved Class II sources display a variety of crystalline features, similar to the ones present in different types of meteorites. At even later stages of disk evolution, we observe clear evidence for dust filtration in the inner disks of transition objects suspected to harbour giant planets.