

Imaging observations to understand dust grains in young circumstellar disks

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Circumstellar disks around young stars are the likely sites of planet formation, thus observations of physical and chemical properties of disk material are essential to understand planet building processes. One of the recent highlights of observations for such disks is the discovery of transitional disks with clear spiral arms by high-angular-resolution and high-contrast imaging with Subaru. Those observations employ polarization differential imaging (PDI) method, combined with adaptive optics, where the scattered light from dust grains is detected while the un-polarized stellar component is subtracted out. The technique is very powerful to probe the inner part of the disk compared to classical methods, thus to reveal the signs of interaction between the disk and possible planets. For instance, observations with the state-of-the-art instruments have successfully detected disks typically beyond 30 AU from the central stars with the angular resolution of about 9 AU. In addition, the polarized light tells us about properties of scatterers in the disk since polarization depends such as on grain size, composition, shape, and porosity as well as the scattering angle. Given the current situation that PDI is becoming the major technique for disk imaging, it is useful to discuss how we can derive information on realistic dust grains from such data. In this talk, I will review the recent observational efforts especially in PDI and introduce the attempts to put constraints on grain properties in young circumstellar disks.

Keywords: astronomical observations, polarization, circumstellar disks, dust grains