Z101r Early Planet Formation in Embedded Disks (eDisk): overview and first results

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The ubiquitous detections of substructures, particularly rings and gaps, in protoplanetary disks around T Tauri stars raise the intriguing possibility that at least some planet formation may have started already during the embedded stages of star formation and evolution. In order to address exactly how and when planet formation might begin, the Large Program "Early Planet Formation in Embedded Disks (eDisk)" has been conducted with the Atacama Large Millimeter/submillimeter Array (ALMA), aiming to search for substructures in disks around 12 Class 0 and 7 Class I protostars in nearby (<200 pc) star forming regions at a resolution of ~ 5 au ($0\farcs04$) in the 1.3 mm continuum. The first-look results show that the continuum emission, mostly arising from disks around the sample protostars, have relatively few distinctive substructures, such as rings and spirals, in marked contrast to Class II disks. The drastic difference from Class II disks may suggest that substructures quickly develop in disks when the systems evolve from protostars to Class II sources or alternatively that high optical depth of the continuum emission could obscure the internal structures. Kinematic information also obtained through CO isotopologue lines and other lines reveal the presence of Keplerian disks around protostars, providing us with crucial physical parameters, in particular, the dynamical mass of the central protostars. In this presentation, we describe the background of the eDisk program, the sample selection and their ALMA observations, the data reduction, and also highlight representative first-look results.