

## P102a Surprisingly High Star Formation Efficiency?: The Envelope-Protostellar Mass Relationship

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Stars are widely believed to form within dense molecular cloud cores, commonly referred to as envelopes with scales of several 1,000 au. The star formation process can therefore be described as the transfer of mass from the envelope to the central protostar. Based on the protostellar sample observed in the ALMA Large Program Early Planet Formation in Embedded Disks (eDisk), we investigate the relationship between envelope mass ( $M_{env}$ ), derived from dust continuum emission measured with single-dish telescopes, and protostellar mass ( $M_{ps}$ ), estimated from Keplerian motions of the disk surrounding the protostar. A clear negative correlation was found between  $M_{env}$  and  $M_{ps}$ : as the protostellar mass increases, the envelope mass decreases. This negative correlation is consistent with the expectation that, as protostellar evolution proceeds, mass is progressively transferred from the envelope to the central star. It also implies that the ratio  $M_{ps} / M_{env}$  increases over time. Notably, the observed ratios tend to be relatively large—often exceeding 1—suggesting that the remaining envelope mass may be insufficient to form a solar-type star without additional mass supply from outside the envelope. In this presentation, I will discuss the concept of instantaneous star formation efficiency (i-SFE), defined as  $|\frac{dM_{ps}}{dM_{env}}|$ , in the context of this negative correlation. I will also briefly explore how disk mass may evolve during the star formation process.