

CHONDRULES, CAIs, AND DUST IN PROTO-PLANETARY DISKS IN THE FRAMEWORK OF PHOTOPHORETIC FORCESG. Wurm¹, H. Haack², J. Teiser¹, A. Bischoff¹, J. Roszjar¹.¹Institut für Planetologie, University of Münster, Wilhelm-Klemm-Str. 10, D-48149 Münster. E-mail: gwurm@uni-muenster.de. ²Geological Museum, Øster Voldgade 5-7, 1350 Copenhagen K, Denmark.

Introduction: Transport processes are fundamental to the early Solar System. In recent years it was proposed that photophoresis can be an important component in moving chondrules, CAIs, and dust over far and short range distances [1-3]. We relate first values from laboratory experiments to formerly assumed properties of chondrules and dust aggregates with respect to photophoresis.

Experiment and estimate: The basic quantity in photophoretic transport models is the photophoretic force on particles itself. As many particle parameters enter (optical properties, thermal properties, and surface properties) only estimates could be given so far for dust aggregates and chondrules. In a first set of experiments we quantified photophoretic forces under microgravity at the drop tower in Bremen [4]. We used bare and dust mantled chondrules from the Bjurböle meteorite and mm-sized SiC dust aggregates.

The photophoretic picture: Chondrules, mantled chondrules and dust aggregates represent a sequence in the strength of photophoretic forces for a given light source from low to strong, respectively [4]. Due to this variation in photophoretic strength, the different particle categories are transported differently in protoplanetary disks, radially and vertically. We will discuss some of the consequences. (1) Dust aggregates are transported to the surface of protoplanetary disks [5]. (2) In energetic events CAIs are transported over the surface of the disk from the inner system to several AU [5]. (3) All particles are strongly concentrated at dense inner disk edges [2, 3]. (4) Chondrules and mantled chondrules move to the asteroid belt region in late stage disk evolution [1]. (5) Photophoresis sorts particles according to size and other properties [1]. (6) Photophoresis transports dust particles to several tens of AU in late stage disk evolution [2].

References: [1] Wurm, G., Krauss, O. 2006, *Icarus* 180, 487-495. [2] Krauss, O. et al. 2007, *A&A* 462, 977-987. [3] Haack, H., Wurm, G. 2007, *M&PSA* 42, 5157. [4] Teiser et al. 2008, this conference. [5] Haack, H., Wurm, G. 2008, this conference.