Determination of Microparticle Flow Mass During Shock-Wave Dusting of Refractory Metals Using Optical Pyrometry Data

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We studied dusting from tantalum, molybdenum, and niobium targets under shock pressures of 205, 185, and 162 GPa, respectively. Optical radiation from microparticles impacting a glass barrier was measured in three spectral channels. A new technique for determining ejecta mass characteristics, complementing the set of known methods [1], was developed. The conversion of impact brightness into mass was performed using empirical dependencies derived from micrometeoroid research [2–4]. Sauter mean diameters were derived from particle mass and free-flight radiation intensity. The technique offers high sensitivity ($\sim$3 μg/cm^3). Additionally direct impact on an optical fiber end face was tested which improve spatial resolution (400 μm diameter). Flow velocities 2.2–4.2 times higher than the target's free surface where detected. This work was supported by State Assignment No. 124020600049-8.

[1] Buttler W T, Williams R J R and Najjar F M 2017 *Journal of Dynamic Behavior of Materials* **3** 151

[2] Friichtenicht J F 1965 Experiments on the impact-light-flash at high velocities Tech. Rep. NASA CR-416 NASA URL `https://nasa.gov`

[3] Eichhorn G 1976 *Planet. Space Sci.* **24** 771

[4] Swift W R, Moser D E, Suggs R M and Cooke W J 2011 An exponential luminous efficiency model for hypervelocity impact into regolith *Meteoroids: The Smallest Solar System Bodies* URL `https://ntrs.nasa.gov/citations/20100024077`