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Compact Micromachined Bandpass Filters for Infrared Planetary Spectroscopy

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Abstract—The thermal instrument strawman payload of the Jupiter Europa Orbiter on the Europa Jupiter Science Mission will map out thermal anomalies, the structure, and atmospheric conditions of Europa and Jupiter within the 7-100 micron spectral range. One key requirement for the payload is that the mass cannot exceed 3.7 kg. Consequently, a new generation of light-weight miniaturized spectrometers needs to be developed. On the path toward developing these spectrometers is development of ancillary miniaturized spectroscopic components. In this paper, we present a strategy for making radiation hard and low mass FIR band pass metal mesh filters. Our strategy involves using MEMS-based fabrication techniques, which will permit the quasi-optical filter structures to be made with micron-scale precision. This will enable us to achieve tight control over both the pass band of the filter and the micromachined silicon support structure architecture, which will facilitate integration of the filters for a variety of applications.