**Title**

**Infrared broadband metasurface absorber for reducing the thermal mass of a microbolometer**

**Abstract**

We demonstrate an infrared broadband metasurface absorber that is suitable for increasing the response speed of a microbolometer by reducing its thermal mass. A large fraction of holes are made in a periodic pattern on a thin lossy metal layer characterised with a non-dispersive effective surface impedance. This can be used as a non-resonant metasurface that can be integrated with a Salisbury screen absorber to construct an absorbing membrane for a microbolometer that can significantly reduce the thermal mass while maintaining high infrared broadband absorption in the long wavelength infrared (LWIR) band. The non-dispersive effective surface impedance can be matched to the free space by optimising the surface resistance of the thin lossy metal layer depending on the size of the patterned holes by using a dc approximation method. In experiments a high broadband absorption was maintained even when the fill factor of the absorbing area was reduced to 28% (hole area: 72%), and it was theoretically maintained even when the fill factor of the absorbing area was reduced to 19% (hole area: 81%). Therefore, a metasurface with a non-dispersive effective surface impedance is a promising solution for reducing the thermal mass of infrared microbolometer pixels.