

**Title:** Supplementary Movie 1:

**Description:** Real-time NIR-II imaging of vessels using IR783@TDIII.

**Title:** Supplementary Movie 2:

**Description:** Real-time high-magnification (2.5×) NIR-II imaging was performed in mice with shaved heads.

**Title:** Supplementary Movie 3:

**Description:** Real-time high-resolution imaging and detection of congenital lymphedema