

Description of Additional Supplementary Files

File Name: Supplementary Movie 1

Description: **Ex vivo electrical pacing.** Ex vivo electrical pacing of a mouse heart shows a visual increase in the rate of mechanical contractions.

File Name: Supplementary Movie 2

Description: **Ex vivo electrical pacing activation map.** Activation map of ex vivo electrical pacing demonstrates anisotropic propagation of the membrane potential originating from the middle of the right ventricle.

File Name: Supplementary Movie 3

Description: **In vivo live pacing.** In vivo live pacing of a rat heart

File Name: Supplementary Movie 4

Description: **Ex vivo optical pacing.** Ex vivo optical pacing of a ChR2-expressing mouse heart

File Name: Supplementary Movie 5

Description: **Heat transfer simulation – bottom view.** Time resolved video of heat transfer simulation bottom view for optical pacing of the optrode at 10 Hz and optical output of 10mW/mm².

File Name: Supplementary Movie 6

Description: **Heat transfer simulation – side view.** Time resolved video of heat transfer simulation side view for optical pacing of the optrode at 10 Hz and optical output of 10mW/mm².