Claims

1. A thrombolysis device comprising:

a catheter configured to be inserted into a blood clot;

a treatment transducer coupled to the catheter, the treatment transducer configured to transmit acoustic waves;

a measurement transducer coupled to the catheter, the measurement transducer configured to transmit further acoustic waves and further configured to receive acoustic echoes, the acoustic echoes being reflections of the further acoustic waves from a boundary of the blood clot, wherein the measurement transducer is further configured to provide a measurement output;

a determination circuit configured to determine at least one of a viscosity of blood in a vicinity of the measurement transducer or a volume of the blood clot, based on the measurement output; and

a control circuit configured to generate control signals for controlling the treatment transducer, based on at least one from the group consisting of the viscosity of blood in the vicinity of the measurement transducer, the volume of the blood clot and a temperature measurement of the blood clot;

wherein the determination circuit is further configured to determine the temperature measurement of the blood clot, based on the measurement output.

2. The thrombolysis device of claim 1, wherein the measurement output comprises at least one of a resonant frequency of the measurement transducer or a travelling time of the acoustic echoes.

3. The thrombolysis device of claim 2, wherein the viscosity of blood in the vicinity of the measurement transducer is determined based on the resonant frequency of the measurement transducer.

4. The thrombolysis device of claim 2, wherein the volume of the blood clot is determined based on the travelling time of the acoustic echoes.

5. The thrombolysis device of claim 1, wherein at least one of the treatment transducer or the measurement transducer is arranged on at least one of an end of the catheter or a sidewall of the catheter.

6. The thrombolysis device of claim 1, wherein the treatment transducer comprises a micromachined transducer element.

7. The thrombolysis device of claim 6, wherein the treatment transducer further comprises a front-end circuit configured to control the micromachined transducer element of the treatment transducer.

8. The thrombolysis device of claim 1, wherein the measurement transducer comprises a micromachined transducer element.

9. The thrombolysis device of claim 8, wherein the measurement transducer further comprises a front-end circuit configured to control the micromachined transducer element of the measurement transducer.

10. The thrombolysis device of claim 1, wherein the treatment transducer comprises a first micromachined transducer element and the measurement transducer comprises a second micromachined transducer element.

11. The thrombolysis device of claim 10, wherein the first micromachined transducer element and the second micromachined transducer element are fabricated on a common semiconductor device.

12. The thrombolysis device of claim 1, wherein the acoustic waves are continuous sound waves.

13. The thrombolysis device of claim 1, wherein the further acoustic waves are a series of pulses.

14. The thrombolysis device of claim 1, wherein the acoustic waves have a frequency within a range of 10 kHz to 100 kHz.

15. The thrombolysis device of claim 1, wherein the further acoustic waves have a frequency within a range of 1 MHz to 10 MHz.

16. The thrombolysis device of claim 1, wherein the control signals are configured to control at least one of a driving voltage of the treatment transducer or an operation duration of the treatment transducer.

17. The thrombolysis device of claim 1, wherein the determination circuit is further configured to determine the temperature measurement of the blood clot, based on an attenuation and delay of the further acoustic waves.

18. The thrombolysis device of claim 1, further comprising a temperature sensor coupled to the catheter, the temperature sensor configured to provide the temperature measurement of the blood clot.

19. The thrombolysis device of claim 18, wherein the temperature sensor is positioned within the catheter.