

[CLAIMS]

1. A reaction processor that performs a reaction process of a sample by applying a thermal cycle to the sample, comprising:

a reaction processing vessel that has a channel in which the sample can move, a first communication port that is provided at one end of the channel, and a second communication port that is provided at the other end of the channel;

a pressurizing chamber that is capable of maintaining the internal pressure thereof to be higher than the air pressure in the surrounding environment of the reaction processor;

a first liquid feeding pump that is arranged inside the pressurizing chamber while the output side thereof communicates with the first communication port;

a second liquid feeding pump that is arranged inside the pressurizing chamber while the output side thereof communicates with the second communication port; and

a control unit that controls the first liquid feeding pump and the second liquid feeding pump in order to move the sample inside the channel,

wherein, by maintaining the pressure inside the pressurizing chamber to be higher than the air pressure in the surrounding environment of the reaction processor, the pressure inside the channel can be maintained to be higher than the air pressure in the surrounding environment of the reaction processor via the first liquid feeding pump and the second liquid feeding pump.

2. A reaction processor that performs a reaction process of a sample by applying a thermal cycle to the sample, comprising:

a reaction processing vessel that has a channel in which the sample can move, a first communication port that is provided at one end of the channel, and a second communication port that is provided at the other end of the channel;

a pressurizing chamber that is capable of maintaining the internal pressure thereof to be higher than the air pressure in the surrounding environment of the reaction processor;

a liquid feeding chamber that is capable of maintaining the internal pressure thereof to be a pressure that is higher than

that inside the pressurizing chamber;

a first direction switching valve that allows either one of the pressurizing chamber and the liquid feeding chamber to communicate with the first communication port provided at one end of the channel of the reaction processing vessel;

a second direction switching valve that allows either one of the pressurizing chamber and the liquid feeding chamber to communicate with a second communication port provided at the other end of the channel of the reaction processing vessel, and

a control unit that controls the first direction switching valve and the second direction switching valve in order to move the sample inside the channel,

wherein, by setting the pressure inside the pressurizing chamber to be higher than the air pressure in the surrounding environment of the reaction processor and setting the pressure inside the liquid feeding chamber to be higher than the pressure inside the pressurizing chamber, the pressurizing chamber and the liquid feeding chamber are connected to the first communication port and the second communication port, respectively, via the

first direction switching valve and the second direction switching valve such that the pressure inside the channel can be maintained to be higher than the air pressure in the surrounding environment of the reaction processor.

3. The reaction processor according to claim 1 or 2,
wherein the sample includes DNA, a PCR reagent, and a reagent that emits fluorescence, and
wherein the reaction process involves PCR.

4. The reaction processor according to any one of claims 1 through 3, further comprising one or more fluorescence detectors for detecting fluorescence emitted from the sample inside the channel,

wherein the control unit controls the movement of the sample based on a signal from the fluorescence detector.

5. The reaction processor according to claim 4,
wherein the reaction processing vessel has a thermal cycle

region formed of a plurality of temperature regions maintained at different temperatures and a channel that connects these temperature regions, and

wherein the fluorescence detector is arranged so as to detect fluorescence from the sample inside the channel connecting the temperature regions.

6. A reaction processing method comprising:

placing a reaction processing vessel into which a sample has been introduced on a reaction processor;

connecting the secondary side of a first liquid feeding pump arranged inside a pressurizing chamber with a first communication port at one end of a channel of the reaction processing vessel;

connecting the secondary side of a second liquid feeding pump arranged inside the pressurizing chamber with a second communication port at the other end of the channel of the reaction processing vessel;

setting the pressure inside the pressurizing chamber to be higher than the air pressure in the surrounding environment of

the reaction processor, thereby increasing the pressure inside the channel to be higher than the air pressure in the surrounding environment of the reaction processor via the first liquid feeding pump and the second liquid feeding pump; and

moving the sample inside the channel using a pressure difference between the first communication port and the second communication port inside the channel by controlling the first liquid feeding pump and the second liquid feeding pump and performing a reaction process of the sample by moving the sample inside the channel.

7. The reaction processing method according to claim 6, further comprising:

setting a plurality of temperature regions of the channel to be different temperatures before the moving of the sample inside the channel,

wherein, in the moving of the sample inside the channel, by controlling the first liquid feeding pump and the second liquid feeding pump so as to repeatedly move the sample in the a plurality

of temperature regions, a reaction process of the sample is performed.

8. The reaction processing method according to claim 7, wherein, in the moving of the sample inside the channel, the operation of the first liquid feeding pump and the second liquid feeding pump is stopped, and the air pressure on the first communication port side and the air pressure on the second communication port side inside the channel are equalized, so as to stop the sample in the plurality of temperature regions.

9. The reaction processing method according to claim 8, further comprising arranging a fluorescence detector in a channel connecting the plurality of temperature regions and detecting, by means of the fluorescence detector, where in the plurality of temperature regions and the channel connecting the temperature regions the sample including a reagent that emits fluorescence is located.

10. A reaction processing method comprising:

placing a reaction processing vessel into which a sample has been introduced on a reaction processor;

connecting the supply side of a first direction switching valve to a pressurizing chamber and a liquid feeding chamber and connecting the discharge side of the first direction switching valve to a first communication port provided at one end of a channel of the reaction processing vessel, while the first direction switching valve is capable of switching the supply side to either one of the pressurizing chamber and the liquid feeding chamber;

connecting the supply side of a second direction switching valve to the pressurizing chamber and the liquid feeding chamber and connecting the discharge side of the second direction switching valve to a second communication port provided at the other end of the channel of the reaction processing vessel, while the second direction switching valve is capable of switching the supply side to either one of the pressurizing chamber and the liquid feeding chamber;

switching the first direction switching valve and the

second direction switching valve such that the pressurizing chamber communicates with the first communication port and the second communication port, respectively;

setting the pressure inside the pressurizing chamber to be higher than the air pressure in the surrounding environment of the reaction processor, thereby increasing the pressure inside the channel to be higher than the air pressure in the surrounding environment of the reaction processor via the first direction switching valve and the second direction switching valve;

setting the pressure inside the liquid feeding chamber to be higher than the pressure inside the pressurizing chamber; and

switching the first direction switching valve and the second direction switching valve such that the liquid feeding chamber communicates with the first communication port and the second communication port, respectively, so as to move the sample inside the channel using a pressure difference between the first communication port and the second communication port inside the channel and performing a reaction process of the sample by moving the sample inside the channel.

11. The reaction processing method according to claim 10, further comprising:

setting a plurality of temperature regions of the channel to be different temperatures before the moving of the sample inside the channel,

wherein, in the moving of the sample inside the channel, by controlling the first direction switching valve and the second direction switching valve so as to repeatedly move the sample in the plurality of temperature regions, a reaction process of the sample is performed.

12. The reaction processing method according to claim 11, wherein, in the moving of the sample inside the channel, the supply side of the first direction switching valve and the supply side of the second direction switching valve are switched to the pressurizing chamber, and the air pressure on the first communication port side and the air pressure on the second communication port side inside the channel are equalized, so as

to stop the sample in the plurality of temperature regions.