WHAT IS CLAIMED IS:

1. A nucleic acid extraction method implemented in a biochip cartridge having a sample chamber, a first wash buffer chamber, a second wash buffer chamber, an elution buffer chamber, a nucleic acid catching chamber and a waste chamber, wherein the nucleic acid catching chamber is connected with all the other chambers, and a pressurized gas is introduced into the chambers to drive fluids to flow between the chambers of the biochip cartridge, the nucleic acid extraction method comprising steps of:

(a) providing a mixture of a sample and a lysis buffer in the sample chamber, wherein the pH of the lysis buffer is lower than 7;

(b) transferring the mixture of the sample and the lysis buffer to a nucleic acid catching chamber containing chitosan beads or chitosan membrane by applying a positive pressure to the sample chamber, so that nucleic acid of the sample is bound to the chitosan beads or chitosan membrane;

(c) pushing a first wash buffer having a pH lower than 7 from the first wash buffer chamber to the nucleic acid catching chamber by applying a positive pressure to the first wash buffer chamber for a certain time period, and then washing the chitosan beads or chitosan membrane with the first wash buffer from the first wash buffer chamber by applying a positive pressure to the first wash buffer chamber and applying a negative pressure to the waste chamber, so that the first wash buffer is continuously transferred from the first wash buffer chamber to the waste chamber through the nucleic acid catching chamber to remove residual protein and cell debris;

(d) neutralizing the pH of the nucleic acid catching chamber through washing the chitosan beads or chitosan membrane with a second wash buffer from the second wash buffer chamber by applying a positive

pressure to the second wash buffer chamber and applying a negative pressure to the waste chamber, so that the second wash buffer is continuously transferred from the second wash buffer chamber to the waste chamber through the nucleic acid catching chamber, wherein the pH of the second wash buffer is in a range between 9 and 11 to increase the pH of the nucleic acid catching chamber to close to 7; and

(e) eluting the chitosan beads or chitosan membrane with an elution buffer from the elution buffer chamber by applying a positive pressure to the elution buffer chamber while heating the chitosan beads or chitosan membrane, so that the nucleic acid is separated from the chitosan beads or chitosan membrane, wherein the pH of the elution buffer is in a range between 9 and 11,

wherein the step (c) is performed twice for increasing washing efficacy.

2. The nucleic acid extraction method according to claim 1, wherein the pH of the first wash buffer is in a range between 4 and 7.

3. The nucleic acid extraction method according to claim 1, wherein the first wash buffer includes tris(hydroxymethyl)aminomethane (Tris), bis(2-hydroxyethyl)amino tris(hydroxymethyl)methane (BIS-TRIS), 1,3-bis(tris(hydroxymethyl)methylamino) propane (Bis-Tris Propane) and 3-(N-morpholino)propanesulfonic acid (MOPS).

4. The nucleic acid extraction method according to claim 1, wherein the second wash buffer includes 2-amino-2-methyl-1-propanol (AMP), tris(hydroxymethyl)aminomethane (Tris), N,N,-bis-(2-Hydroxyethyl) glycine (BICINE) and 4-(2-hydroxyethyl)-1-piperazineethanesulfonic acid (HEPES).

5. The nucleic acid extraction method according to claim 1, wherein the pH of the lysis buffer is in a range between 4 and 7.

6. The nucleic acid extraction method according to claim 1, wherein the

lysis buffer includes tris(hydroxymethyl)aminomethane (Tris), bis(2-hydroxyethyl)amino tris(hydroxymethyl)methane (BIS-TRIS), 1,3-bis(tris(hydroxymethyl)methylamino) propane (Bis-Tris Propane) and 3-(N-morpholino)propanesulfonic acid (MOPS).

7. The nucleic acid extraction method according to claim 1, wherein the lysis buffer contains a cell lysis detergent.

8. The nucleic acid extraction method according to claim 1, wherein the elution buffer includes 2-amino-2-methyl-1-propanol (AMP), tris(hydroxymethyl)aminomethane (Tris), N,N,-bis-(2-Hydroxyethyl) glycine (BICINE) and 4-(2-hydroxyethyl)-1-piperazineethanesulfonic acid (HEPES).

9. The nucleic acid extraction method according to claim 1, wherein in the step (d), the chitosan beads or chitosan membrane is heated to 35~65°C.

10. The nucleic acid extraction method according to claim 1, wherein a heater plate is disposed under the nucleic acid catching chamber for heating the chitosan beads or chitosan membrane.