

CLAIMS

We claim:

1. A system for isolating nucleic acid material, the system comprising:
 - a magnetic device for facilitating a magnetic field for isolating the nucleic acid material from at least one sample, the magnetic device comprising:
 - a support component; and
 - a set of magnetic pins attached to the support component and movable with at least three degrees of freedom when attached to the support component,
 - wherein each pin of the set of magnetic pins is independently movable from one another with at least three degrees of freedom,
 - wherein the set of magnetic pins is configured to be inserted into at least one sample compartment housing the at least one sample to directly attract magnetic beads attached with the nucleic acid material from the at least one sample, wherein the independent movability of the set of magnetic pins and the movability with the at least three degrees of freedom of the set of magnetic pins provide adaptability to positions of magnetic beads attached with the nucleic acid material from the sample without intervening surfaces between the set of magnetic pins and the directly attracted magnetic beads attached with the nucleic acid material.
2. The system of Claim 1, wherein the magnetic device is integrable with an automated robotic sample processing platform.
3. The system of Claim 2, wherein the magnetic device comprises a compression grip component for integration with the automated robotic sample processing platform, wherein the compression grip component comprises at least one of: a tong, a clamp, and a fastener.
4. The system of Claim 1, wherein the magnetic device is attachable to a vibrating tool for facilitating release of the magnetic beads from the magnetic pins.

5. The system of Claim 1, wherein the support component is movable for displacing the set of magnetic pins out of the sample compartments and into at least one of a washing solution and an elution solution.

6. The system of Claim 1, wherein the set of magnetic pins is housed in a set of contact interfaces providing an intermediary between the set of magnetic pins and the sample when the set of magnetic pins is inserted into the sample compartments, wherein each contact interface houses at least one magnetic pin of the set of magnetic pins.

~~7. The system of Claim 1, wherein the set of magnetic pins is configured to be inserted into the sample compartments to directly attract magnetic beads attached with the nucleic acid material from the sample, without intervening surfaces between the set of magnetic pins and the directly attracted magnetic beads attached with the nucleic acid material.~~

~~8.7. The system of Claim 1, wherein the set of magnetic pins comprises 96 magnetic pins with facet and position adaptability in at least 3 axes, for adapting to each well location and surface shape of a 96 well plate.~~

~~9.8. The system of Claim 1, wherein each pin of the set of magnetic pins is removable from and re-attachable to the support component, for adapting configuration of the set of magnetic pins to a set of different sample compartments comprising different numbers of sample wells, from 1 to 96 wells.~~

~~10.9. The system of Claim 1, wherein the support component comprises:~~
a freely movable lid; and
a plate attached to the freely movable lid and comprising a set of perforations, wherein each magnetic pin of the set of magnetic pins is mountable to each perforation of the set of perforations.

~~11~~10. The system of Claim 1, wherein the at least three degrees of freedom comprise a first degree of freedom in x-axis, a second degree of freedom in y-axis, and a third degree of freedom in z-axis.

~~12~~11. A method for isolating nucleic acid material, the method comprising:
_____ inserting a set of magnetic pins of a magnetic device into at least one sample mixture comprising magnetic beads attached with nucleic acid material such that the set of magnetic pins is inserted into sample compartments housing the at least one sample mixture to directly attract magnetic beads attached with the nucleic acid material from the at least one sample mixture, without intervening surfaces between the set of magnetic pins and the directly attracted magnetic beads attached with the nucleic acid material,
_____ wherein the set of magnetic pins- is movable with at least three degrees of freedom when attached to a support component of the magnetic device, and
_____ wherein each pin of the set of magnetic pins is independently movable from one another ~~when attached to the support component, and wherein the independent movability of the set of magnetic pins and the movability with the at least three degrees of freedom of the set of magnetic pins provide adaptability to positions of the magnetic beads attached with the nucleic acid material~~ when attached to the support component.

~~13~~12. The method of Claim ~~12~~11, further comprising incubating the set of magnetic pins in the at least one sample mixture for between 0.5 and 10 minutes.

~~14~~13. The method of Claim ~~13~~12, further comprising, after removal of the set of magnetic pins from the at least one sample mixture, inserting the set of magnetic pins into at least one of a washing solution and an elution solution.

~~15~~14. The method of Claim ~~14~~13, further comprising, after inserting the set of magnetic pins into the at least one of the washing solution and the elution solution, using a vibrating device to release the magnetic beads from the set of magnetic pins.

~~16-15.~~ The method of Claim ~~15~~14, wherein the set of magnetic pins is housed in a set of contact interfaces providing a first intermediary between the set of magnetic pins and the sample mixture, a second intermediary between the set of magnetic pins and the at least one of the washing solution and the elution solution.

~~17.~~ The method of Claim ~~12~~, wherein the independent movability of the set of magnetic pins and the movability with the at least three degrees of freedom of the set of magnetic pins facilitate direct attraction of magnetic beads attached with the nucleic acid material, without intervening surfaces between the set of magnetic pins and the directly attracted magnetic beads attached with the nucleic acid material.

~~18-16.~~ The method of Claim ~~12~~11, wherein the at least three degrees of freedom comprise a first degree of freedom in x-axis, a second degree of freedom in y-axis, and a third degree of freedom in z-axis.

~~19-17.~~ The method of Claim ~~12~~11, further comprising, before inserting the set of magnetic pins of -into the at least one sample mixture, integrating the magnetic device with an automated robotic sample processing platform.

~~20-18.~~ The method of Claim ~~12~~11, wherein integrating the magnetic device comprises integrating the magnetic device via a compression grip component of the magnetic device, wherein the compression grip component comprises at least one of: a tong, a clamp, and a fastener.