[0004] A need therefore exists to facilitate tracking and usage of instruments and consumables used in molecular analysis and improve the overall ease, flexibility, and reliability of molecular analysis workflows.

BRIEF SUMMARY

[0004a] An aspect provides a system for performing a molecular analysis, the system comprising: a reaction plate having multiple reaction sites and comprising a reaction plate RFID tag, the reaction plate RFID tag storing and/or sharing information for a workflow for the molecular analysis, wherein the reaction plate is configured to provide multiple assays, and wherein the reaction plate RFID tag includes stored thereon plate layout information defining which of the multiple assays are associated with which reaction sites of the reaction plate.

[0004b] Another aspect provides a method for performing a molecular analysis, the method comprising: reading a reaction plate RFID tag on a reaction plate, the reaction plate having multiple reaction sites; optionally reading a reagent container RFID tag on a reagent container; and applying information read from the reaction plate RFID tag, and optionally from the reagent container RFID tag, to carry out a workflow for the molecular analysis, the information read from the reaction plate RFID tag and optionally the reagent container RFID tag including information identifying a subset of reaction sites among the multiple reaction sites and instructing transfer of a reagent to the subset of reaction sites.

[0004c] Another aspect provides a smart consumable for performing a molecular analysis workflow, the smart consumable comprising at least one of: a reaction holder comprising multiple reaction sites and a reaction holder RFID tag, wherein the reaction holder RFID tag sends and receives and/or stores information regarding a workflow for the molecular analysis, wherein one or more reaction sites include a first reagent, and wherein the reaction holder RFID tag includes information identifying which of the multiple reaction sites include the first reagent; and a reagent container comprising a reagent container RFID tag, wherein the reagent container RFID tag sends and receives and/or stores information regarding the workflow for the molecular analysis, wherein the reagent container RFID tag includes transfer instructions for applying a particular volume of a second reagent to the one or more reaction sites identified as having the first reagent.

[0005] The present disclosure provides a system for performing a molecular analysis. The molecular analysis can involve a workflow for a polymerase chain reaction (PCR). For example the workflow for the PCR molecular analysis may comprise a quantitative PCR (qPCR), an end point PCR (epPCR), a reverse transcription-PCR (RT-PCR), or a proximity ligation assay (PLA) involving PCR. The system, as disclosed herein, can comprise smart consumables. The smart consumables can include, for example, one or more smart reaction substrates or reaction holders (e.g., reaction plates or reaction arrays) and/or one or more smart a reagent containers The smart consumable may be a smart reaction holder, such as a reaction plate or a reaction array, and/or a smart reagent container. Each of the smart reaction substrates or reaction

holders can comprise a reaction substrate or a reaction holder RFID tag. Likewise, each of the reagent containers can comprise a reagent container RFID tag. Working together or separately, the reaction substrate or reaction holder RFID tag(s) and the reagent container RFID tag(s) can store and share various data or information. The reaction substrate or reaction holder RFID tag(s) and the reagent container RFID tag(s) can both send and/or receive information. An RFID tag reader can read information stored on an RFID tag. An RFID writer can write (or rewrite) information to an RFID tag.

[0006] The reaction substrate or reaction holder can comprise at least one reaction site. Alternatively, the reaction substrate or reaction holder can comprise a plurality of reaction sites. One or more reaction sites of a reaction substrate or reaction holder can comprise a first reagent. In some cases, the first reagent of each reaction site of a reaction substrate or reaction holder is the same. In some other cases, the first reagent of each reaction site of a reaction substrate or reaction holder is different. Some portion (e.g., one or more) or all of the plurality of the reaction sites of a reaction substrate or reaction holder can comprise a first reagent. In some cases, some portion of the plurality of reaction sites may be left blank or empty. The first reagent of the reaction sites of a reaction substrate or reaction holder can be pre-spotted onto the reaction substrate or reaction holder. The first reagent can be dry-spotted onto the reaction substrate or reaction holder.

CLAIMS

Claim 1. A system for performing a molecular analysis, the system comprising:

a reaction plate having multiple reaction sites and comprising a reaction plate RFID tag, the reaction plate RFID tag storing and/or sharing information for a workflow for the molecular analysis,

wherein the reaction plate is configured to provide multiple assays, and

wherein the reaction plate RFID tag includes stored thereon plate layout information defining which of the multiple assays are associated with which reaction sites of the reaction plate.

Claim 2. A method for performing a molecular analysis, the method comprising:

reading a reaction plate RFID tag on a reaction plate, the reaction plate having multiple reaction sites;

optionally reading a reagent container RFID tag on a reagent container; and

applying information read from the reaction plate RFID tag, and optionally from the reagent container RFID tag, to carry out a workflow for the molecular analysis, the information read from the reaction plate RFID tag and optionally the reagent container RFID tag including information identifying a subset of reaction sites among the multiple reaction sites and instructing transfer of a reagent to the subset of reaction sites.

Claim 3. The method of claim 2, further comprising:

reading identification of a first reagent from the reaction plate RFID tag, the first reagent being present within the subset of reaction sites; and

reading an identification of a second reagent from the reagent container RFID tag, wherein the second reagent is the reagent that is instructed to be transferred to the subset of reaction sites.

Claim 4. The method of claim 2, further comprising:

reading from the reaction plate RFID tag a temperature history for the reaction plate, a light exposure history for the reaction plate, and/or a motion detection history for the reaction plate, and/or reading from the reagent container RFID tag a temperature history for the reagent container, a light exposure history for the reagent container, and/or a motion detection history for the reagent container.

Claim 5. The method of claim 3, further comprising:

reading from the reaction plate RFID tag data regarding characteristics of the reaction plate; and/or

reading from the reagent container RFID tag data regarding characteristics of the second reagent.

Claim 6. The method of claim 2, further comprising:

providing a visual and/or verbal guide for the workflow based on the information read from the reaction plate RFID tag and optionally from the reagent container RFID tag.

Claim 7. The method of claim 3, further comprising:

downloading the workflow for the molecular analysis from a network server system, the workflow comprising an analysis protocol for the reaction plate.

Claim 8. The method of claim 7, the analysis protocol comprising an instruction for liquid reagent, and/or sample transfer of one or more reagents to the reaction plate.

Claim 9. The method of claim 2, further comprising:

operating an RFID writer to record a record on the reaction plate RFID tag of a liquid, reagent, and/or sample transfer to the reaction plate.

Claim 10. The method of claim 9, the record comprising a reaction volume of the liquid transfer.

Claim 11. The method of claim 9, further comprising:

operating the RFID writer to record an identification of a reaction site of the reaction plate to which the liquid reagent, and/or sample transfer is applied.

Claim 12. The method of claim 9, further comprising:

operating the RFID writer to record a date and/or time at which the liquid, reagent, and/or sample transfer is applied to the reaction plate.

Claim 13. The method of claim 3, further comprising:

applying the information stored by the reaction plate RFID tag and the reagent container RFID tag to an instruction for mixing the first reagent with the second reagent in the workflow for the molecular analysis.

Claim 14. The method of claim 8, the instruction comprising a reaction site on the reaction plate comprising the first reagent, and an instruction for a liquid reagent, and/or sample transfer of the second reagent to the reaction site; and/or the instruction comprising a reaction volume of the second reagent.

Claim 15. The method of claim 2, further comprising:

reading the reaction plate RFID tag for an analysis protocol for the workflow.

Claim 16. The method of claim 15, the analysis protocol comprising an instruction for a liquid transfer of one or more reagents to the reaction plate.

Claim 17. The method of claim 2, further comprising:

reading the reaction plate RFID tag for an identification of a reagent contained at a reaction site on the reaction plate.

Claim 18. The method of claim 2, further comprising:

reading the reaction plate RFID tag for an identification of a next reaction plate in the workflow for the molecular analysis.

Claim 19. The method of claim 3, further comprising:

writing information about the reaction plate, the reagent container, the first reagent, the second reagent, and/or the molecular analysis to the reaction plate RFID tag and/or the reagent container RFID tag(s).

Claim 20. A smart consumable for performing a molecular analysis workflow, the smart consumable comprising at least one of:

a reaction holder comprising multiple reaction sites and a reaction holder RFID tag, wherein the reaction holder RFID tag sends and receives and/or stores information regarding a workflow for the molecular analysis, wherein one or more reaction sites include a first reagent, and wherein the reaction holder RFID tag includes information identifying which of the multiple reaction sites include the first reagent; and

a reagent container comprising a reagent container RFID tag, wherein the reagent container RFID tag sends and receives and/or stores information regarding the workflow for the molecular analysis, wherein the reagent container RFID tag includes transfer instructions for applying a particular volume of a second reagent to the one or more reaction sites identified as having the first reagent.