CLAIMS:

1. A method of detecting the presence of a target cell within a biological sample using an instrument, comprising:
   - conveying a plurality of transduction particles associated with the target cell from a reagent module into a sample container containing the biological sample, the reagent module coupled to the sample container during the conveying such that the sample container is fluidically isolated from an exterior volume, the plurality of transduction particles engineered to be non-replicative and to include a nucleic acid molecule formulated to cause the target cell to produce a plurality of reporter molecules, the plurality of transduction particles formulated to bind to and deliver the nucleic acid molecule into the target cell;
   - maintaining, after the conveying, the biological sample and the plurality of transduction particles within the sample container for a time period to allow the plurality of reporter molecules to be produced within the sample container when the target cell is present in the biological sample;
   - exerting a force on the reagent module to place a seal surface of the reagent module in contact with a corresponding surface of the instrument to optically isolate the sample container from the exterior volume, the seal surface in a fixed location relative to the sample container;
   - conveying, after the exerting, a reagent from the reagent module into the sample container, the reagent formulated to react with the plurality of reporter molecules to catalyze production of a signal, the seal surface being maintained in contact with the corresponding surface during the conveying the reagent; and
   - receiving via a detector of the instrument, the signal associated with a quantity of the plurality of reporter molecules.

2. The method of claim 1, wherein the plurality of transduction particles is derived from a bacteriophage and is engineered to be incapable of lysogenic replication and lytic replication.

3. The method of claim 1, wherein the plurality of transduction particles includes a viral vector devoid of a wild-type DNA capable of exhibiting wild-type viral functions ssociated with a virus from which the viral vector is derived.

4. The method of claim 1, wherein the target cell is a bacteria selected from the group consisting of *Escherichia, Mycobacterium, Staphylococcus, Li steria, Clostridium, Enterococcus, Streptococcus, Helicobacter, Rickettsia, Haemophilus, Xenorhabdus, Acinetobacter, Bordetella, Pseudomonas, Aeromonas, Actinobacillus, Pasteurella, Vibrio, Legionella, Bacillus, Calothrix, Methanococcus, Stenotrophomonas, Chlamydia, Neisseria, Salmonella, Shigella, Campylobacter* and *Yersinia.*

5. The method of claim 1, wherein a reporter molecule from the plurality of reporter molecules is any one of a bacterial luciferase, a eukaryotic luciferase, a fluorescent protein, an enzyme suitable for colorimetric detection, a protein suitable for immunodetection, a peptide suitable for immunodetection, or a nucleic acid that function as an apatamer or that exhibits enzymatic activity.

6. The method of claim 1, wherein: the plurality of transduction particles is stored within the reagent module such that the plurality of transduction particles is fluidically isolated from the biological sample after the reagent module is coupled to the sample container and before the conveying the plurality of transduction particles; and the conveying the plurality of transduction particles includes manipulating an actuator of the reagent module to convey the plurality of transduction particles into the biological sample.

7. The method of claim 6, wherein the maintaining includes maintaining the biological sample at a temperature of less than or equal to approximately 45°C, the time period being less than approximately eight hours.

8. The method of claim 7, wherein: the actuator of the reagent module is a first actuator; and the conveying the reagent includes manipulating, a second actuator of the reagent module to convey the reagent into the biological sample.

9. The method of claim 8, wherein the reagent includes a fatty aldehyde, the signal being a light emission signal associated with a flash luminescence reaction.

10. A method of detecting the presence of a target cell within a biological sample, comprising:
    - coupling a reagent module to a sample container such that a reaction chamber defined by the sample container is fluidically isolated from an exterior volume, the

reaction chamber containing the biological sample, the reagent module containing a plurality of transduction particles associated with the target cell and a reagent;

- disposing, after the coupling, at least a distal end portion of the sample container into an instrument; and
- actuating the instrument to cause the instrument to:
  - manipulate the reagent module to convey the plurality of transduction particles into the reaction chamber of the sample container, the plurality of transduction particles associated with a target cell, the plurality of transduction particles engineered to be non-replicative and to include a nucleic acid molecule formulated to cause the target cell to produce a plurality of reporter molecules;
  - maintain the biological sample and the plurality of transduction particles within the reaction chamber within a predetermined temperature range to allow the plurality of reporter molecules to be produced within the reaction chamber when the target cell is present in the biological sample;
  - move the reagent module within the instrument to place a seal surface of the reagent module contact with a corresponding surface of the instrument to optically isolate the reaction chamber from the exterior volume, the seal surface in a fixed location relative to the sample container;
  - manipulate the reagent module to convey the reagent into the reaction chamber of the sample container, the reagent formulated to react with the plurality of reporter molecules to catalyze production of a signal, the seal surface being maintained in contact with the corresponding surface when the reagent module is manipulated; and
  - receive the signal associated with a quantity of the plurality of reporter molecules.

11. The method of claim 10, wherein the biological sample is a raw sample that has not undergone a separation operation or a washing operation, the raw sample being maintained within the sample container fluidically isolated from the exterior volume after the distal end portion of the sample container is disposed into the instrument.

12. The method of claim 10, wherein: the biological sample is a raw sample that has not undergone a separation operation or a washing operation; and the target cell within the biological sample is non-isolated.

13. The method of claim 10, wherein the instrument is configured to maintain the biological sample and the plurality of transduction particles in fluidic isolation from the exterior volume such that no reporter molecules are added from the exterior volume.

14. The method of claim 10, wherein: the signal is a light emission associated with a flash luminescence reaction; and the reagent comprises a fatty aldehyde formulated to catalyze the luminescence reaction.

15. A method of detecting the presence of a target cell within a biological sample, comprising:
    - coupling a reagent module to a sample container such that a reaction chamber defined by the sample container is fluidically isolated from an exterior volume, the reaction chamber containing the biological sample, the reaction chamber devoid of a reporter molecule before the coupling, the reagent module defining a first volume and a second volume, the first volume containing a plurality of transduction particles associated with the target cell, the second volume containing a reagent;
    - disposing, after the coupling, at least a distal end portion of the sample container into an instrument; and
    - actuating the instrument to cause the instrument to:
        - manipulate the reagent module to convey the plurality of transduction particles from the first volume into the reaction chamber of the sample container, the plurality of transduction particles associated with the target cell, the plurality of transduction particles engineered to be non-replicative and to include a nucleic acid molecule formulated to cause the target cell to produce a plurality of reporter molecules;
        - maintain the biological sample and the plurality of transduction particles within the reaction chamber in fluidic isolation from the exterior volume for a time period to allow the plurality of reporter molecules to be produced within the reaction chamber when the target cell is present in the biological sample;
        - exert a force on the reagent module to place a seal surface of the reagent module in contact with a corresponding surface of the instrument to optically isolate the reaction chamber from the exterior volume, the seal surface in a fixed location relative to the sample container;
        - manipulate the reagent module to convey the reagent from the second volume into the reaction chamber of the sample container, the reagent formulated to react with the plurality of reporter molecules to catalyze production of a signal, the seal surface

being maintained in contact with the corresponding surface when the reagent module is manipulated; and

- receive the signal associated with a quantity of the plurality of reporter molecules.

16. The method of claim 15, wherein the instrument is configured to maintain the biological sample and the plurality of transduction particles at a substantially constant temperature to allow the plurality of reporter molecules to be produced.

17. The method of claim 15, wherein the biological sample is a raw sample that has not undergone a separation operation or a washing operation; and the target cell within the biological sample is non-isolated.

18. The method of claim 15, wherein the signal is a light emission associated with a flash luminescence reaction; and the reagent comprises a fatty aldehyde formulated to catalyze the luminescence reaction.

19. The method of claim 15, wherein the target cell is a bacteria selected from the group consisting of *Escherichia, Mycobacterium, Staphylococcus, Listeria, Clostridium, Enterococcus, Streptococcus, Helicobacter, Rickettsia, Haemophilus, Xenorhabdus, Acinetobacter, Bordetella, Pseudomonas, Aeromonas, Aetinobacillus, Pasteurella, Vibrio, Legionella, Bacillus, Calothrix, Methanococcus, Stenotrophomonas, Chlamydia, Neisseria, Salmonella, Shigella, Campylobacter* and *Yersinia.*