**CLAIMS**

1. A method of preparing a characterization zone of an analysis plate in order to carry out at least one characterization of a population of at least one microorganism in the presence of at least one antimicrobial agent, said characterization involving an analysis by mass spectrometry during which the population of at least one microorganism deposited on the characterization zone undergoes at least one ionization step by bombarding the characterization zone with a laser beam in accordance with the matrix-assisted laser desorption-ionization mass spectrometry technique known as MALDI;

the method of preparing the characterization zone being characterized in that it comprises the following steps in succession:

- a step consisting in providing an analysis plate for a characterization by means of the MALDI technique, the plate comprising at least one analysis zone carrying an antimicrobial agent;

- a step of depositing the population of at least one microorganism onto said analysis zone in contact with the antimicrobial agent;

- an incubation step, consisting in preserving the analysis plate under conditions and for a sufficient time to allow the antimicrobial agent and the microorganism that is present to interact; and

- a step of depositing a matrix that is suitable for the MALDI technique onto the analysis zone.

2. The preparation method according to claim 1, characterized in that a population of a single microorganism to be characterized is deposited.

3. The preparation method according to claim 1 or claim 2, characterized in that the deposited population of microorganism(s) is prepared without a prior step of contact with an antimicrobial agent.

4. The preparation method according to any one of claims 1 to 3, characterized in that the population of microorganism(s) is obtained after a step of concentration, enrichment and/or purification and/or corresponding to a colony or to a fraction of a colony obtained after growth on a suitable medium, in particular a gel medium.

5. The preparation method according to any one of claims 1 to 4, characterized in that the antimicrobial agent is selected in a manner such as to allow the resistance due to the production of beta-lactamase, and in particular carbapenemase, to be identified.

6. The preparation method according to any one of claims 1 to 5, characterized in that the antimicrobial agent is an antibiotic, preferably selected from penicillins, cephalosporins, cephamycins, carbapenems, monobactams and in particular from ampicillin, amoxicillin, ticarcillin, piperacillin, cefalotin, cefuroxime, cefoxitin, cefixime, cefotaxime, ceftazidime, ceftriaxone, cefpodoxime, cefepime, aztreonam, ertapenem, imipenem, meropenem, and faropenem.

7. The preparation method according to any one of claims 1 to 6, characterized in that it comprises a functionalization step in order to obtain the analysis plate for a characterization by means of the MALDI technique comprising at least one analysis zone carrying an antimicrobial agent, said functionalization step preferably having been carried out by depositing an aqueous solution of the antimicrobial agent, followed by drying to form a functionalized analysis zone.

8. The preparation method according to claim 7, characterized in that the functionalized analysis zone(s) carry(ies) a single antimicrobial agent.

9. A method of characterizing a population of at least one microorganism, the characterization comprising at least determining the presence or otherwise of a population of a microorganism that is resistant to at least one antimicrobial agent;

the method being characterized in that it comprises the following steps in succession:

- preparing at least one characterization zone of an analysis plate in accordance with a preparation method according to any one of claims 1 to 8;
- using matrix-assisted laser desorption-ionization time of flight mass spectrometry known as MALDI-TOF to analyse, at least once, a population of a microorganism deposited on the characterization zone, in order to be able to

conclude whether a population of a microorganism that is resistant to the antimicrobial agent is present on the characterization zone.

10. The characterization method according to claim 9, characterized in that the analysis by mass spectrometry using the MALDI-TOF technique in order to conclude whether a population of a microorganism that is resistant to the antimicrobial agent is present on the characterization zone consists in verifying the presence of the antimicrobial agent and/or of a degradation product of the antimicrobial agent.

11. The characterization method according to claim 9 or claim 10, characterized in that the characterization additionally comprises identifying the family, genus, or, as is preferable, the species of a population of a microorganism deposited on the characterization zone.

12. The characterization method according to any one of claims 9 to 11, characterized in that:

· identifying the family, genus, or, as is preferable, the species of a population of a microorganism deposited on the characterization zone by carrying out a first analysis by MALDI type mass spectrometry corresponding to a first step of ionizing a characterization zone, and by using a first calibration for the analysis; and

· determining the possible presence on the characterization zone of a population of a microorganism that is resistant to the antimicrobial agent by carrying out a second analysis by mass spectrometry using the MALDI-TOF technique corresponding to a second step of ionizing the same characterization zone, and by using a second calibration for the analysis.

13. The characterization method according to claim 11 or claim 12, characterized in that identifying the family, genus, or, as is preferable, the species of a population of a microorganism and determining whether the possible presence of the antimicrobial agent concerns the same microorganism.

14. A method of characterizing a population of at least one microorganism, the characterization comprising at least:

· identifying the family, genus, or, as is preferable, the species of a population of a microorganism, by carrying out a first analysis by mass spectrometry using the MALDI technique corresponding to a first step of ionizing a characterization zone comprising the population of microorganism(s), the antimicrobial agent and a matrix suitable for the MALDI technique;

· determining the presence of a population of a microorganism that is resistant to at least one antimicrobial agent, by carrying out a second analysis by mass spectrometry using the MALDI technique corresponding to a second step of ionizing a characterization zone comprising the population of at least one microorganism, the antimicrobial agent and a matrix suitable for the MALDI technique;

the method being characterized in that:

- the first analysis and the second analysis are respectively carried out by means of a distinct first step and a distinct second step of ionizing the same characterization zone comprising the population of at least one microorganism and the antimicrobial agent;

- the first analysis uses a first calibration, and the second analysis uses a second calibration that is different from the first calibration.

15. The characterization method according to claim 14, characterized in that the population that is deposited comprises a single microorganism to be characterized.

16. The characterization method according to claim 14 or claim 15, characterized in that it employs a method of preparing a characterization zone of an analysis plate according to any one of claims 1 to 8.

17. An analysis plate intended to receive a population of at least one microorganism to be characterized on an analysis zone by mass spectrometry using the MALDI technique, the plate being characterized in that it includes an antimicrobial agent that has been deposited, in particular in the form of a solid deposit, on said analysis zone of the analysis plate, forming an analysis zone that is said to be functionalized.

18. The analysis plate according to claim 17, characterized in that the functionalized analysis zone is obtained by depositing an aqueous solution of the antimicrobial agent, followed by drying.

19. The analysis plate according to claim 17 or claim 18, characterized in that the antimicrobial agent is immobilized on the analysis zone by electrostatic, ionic, covalent or affinity bonding or, as is preferable, by means of an adhesive agent, for example selected from polymers that are soluble in water.

20. The analysis plate according to any one of claims 17 to 19, characterized in that the plate is formed from a polymer such as polypropylene, which may contain a conductive material such as carbon black, said polymer being covered with a layer of stainless steel.

21. The analysis plate according to any one of claims 17 to 20, characterized in that the plate comprises a plurality of functionalized analysis zones, each carrying an antimicrobial agent.

22. The analysis plate according to any one of claims 17 to 21, characterized in that the plate comprises at least a first functionalized analysis zone carrying a first antimicrobial agent and a second functionalized analysis zone, which is distinct from the first zone, carrying a second antimicrobial agent that is distinct from the first antimicrobial agent.

23. The analysis plate according to any one of claims 17 to 22, characterized in that the or each functionalized analysis zone carries a single antimicrobial agent.

24. The analysis plate according to any one of claims 17 to 23, characterized in that it comprises at least one reference analysis zone intended to subsequently receive a population of a reference microorganism, and in that the surface of the reference analysis zone is free from antimicrobial agent.

25. The analysis plate according to any one of claims 17 to 24, characterized in that it is packaged in hermetically sealed packaging.

26. Use of an analysis plate according to any one of claims 17 to 25, in a characterization method according to any one of claims 9 to 16.