Claims

What is claimed is:

1. A method for producing an article, comprising the following steps:

    (a) providing a green part, wherein the green part comprises powder particles, an ink, and optionally a binder;

    (b) cooling the green part to a temperature below the freezing point of the ink to form a hardened mass and loosely-attached powder particles; and

    (c) removing the loosely-attached powder particles.

2. The method according to Claim 1, further comprising the following step:

    (d) sintering the hardened mass.

3. The method according to Claim 1, wherein the powder particles are temperature-sensitive materials.

4. The method according to Claim 1, wherein the powder particles are selected from the group consisting of zeolite, metal-organic frameworks (MOFs), a metal, a ceramic material, a pharmaceutical drug material and any combination thereof.

5. The method according to Claim 4, wherein the powder particles comprise a composite comprising the zeolite and the MOFs.

6. The method according to Claim 4, wherein the MOFs are selected from the group consisting of ZIF-8, MIL-100, IRMOF-1, M-MOF-74, CPO-27-M, DMOF-1 and any combination thereof and the zeolite are selected from the group consisting of Zeolite 4A, Zeolite 3A, Zeolite 13X, Zeolite Ca-A and any combination thereof.

7. The method according to Claim 1, wherein the ink is selected from the group consisting of deionized water, an alcohol, or any combination thereof.

8. The method according to Claim 1, wherein the binder is selected from the group consisting of bentonite clay, kaolin, silica and any combination thereof.

9. The method according to Claim 1, wherein the size of the powder particles is in the range from 2 μm to 100 μm.

10. The method according to Claim 1, wherein the temperature of cooling in step b) is at least 5°C less than the freezing point of the ink.

11. The method according to Claim 1, wherein the loosely-attached powder particles removed in step (c) are collected and recycled.

12. The method according to Claim 1, wherein the green part is formed by three-dimensional printing, powder pressing or injection molding.

13. The method according to Claim 2, wherein the powder particles in the hardened mass are bonded to form a sintered article.

14. The method according to Claim 13, wherein the article is a porous sintered article.

15. The method according to Claim 2, wherein the ink is removed in step (d).