

Claims

What is claimed is:

1. A box-in-box structure, comprising:
 - thermal clay being in a form of a first box and comprising a polyarysulfone material;
 - a plate; and
 - a film which has at least one side in a form of a second box to be attached to the first box in the presence of the thermal clay so that the first box accommodates the second box to form a box-in-box structure.
2. The box-in-box structure of Claim 1, wherein the polyarysulfone material is selected from a group consisting of a polysulfone, a polyethersulfone and a polyphenylsulfone.
3. The box-in-box structure of Claim 1, wherein the plate includes a metallic material, a filler and a catalytic material.
4. The box-in-box structure of Claim 1, wherein the film is a perfluoropolymer organic film.
5. The box-in-box structure of Claim 1, wherein the thermal clay is in direct contact with the film and with the plate to keep bonding strength between the first box and the second box not less than 15kgf in accordance with IEC68-2-21 Test Ua1.
6. A method to form a box-in-box structure, comprising:
 - providing thermal clay in a form of a first box;
 - providing a film which has at least one side in a form of a second box; and
 - applying the thermal clay to attach a plate and the second box comprising a polyarysulfone material to the first box so that the second box is accommodated in the first box to form a first box-in-box structure.

7. The method to form a box-in-box structure of Claim 6, wherein the thermal clay is applied by a fused deposition modeling printer.
8. The method to form a box-in-box structure of Claim 7, wherein the thermal clay has a temperature from 300°C to 400°C and is softened to be printed.
9. The method to form a box-in-box structure of Claim 7, wherein the thermal clay is applied and stacked on another thermal clay to form a thermal-clay-on-thermal-clay structure.
10. The method to form a box-in-box structure of Claim 6, wherein an interface temperature between the first box and the second box is from 100°C to 150°C.
11. The method to form a box-in-box structure of Claim 6, further comprising:
 - providing a second box-in-box structure; and
 - combining the second box-in-box structure to the first box-in-box structure to form a cell.
12. The method to form a box-in-box structure of Claim 11, wherein the cell comprises at least two box-in-box structures.
13. The method to form a box-in-box structure of Claim 6, wherein heat-generating welding is performed to form the first box-in-box structure.
14. The method to form a box-in-box structure of Claim 11, wherein an insert molding method is used to form the cell.
15. Use of the box-in-box structure of Claim 1 in a fuel cell.
16. Use of thermal clay comprising a polyarylsulfone material and a film in a fused deposition modeling printer for the formation of a

box-in-box structure.