Diffusion barrier property of electroless Ni-W-P coating in high temperature Zn-5Al/Cu solder interconnects

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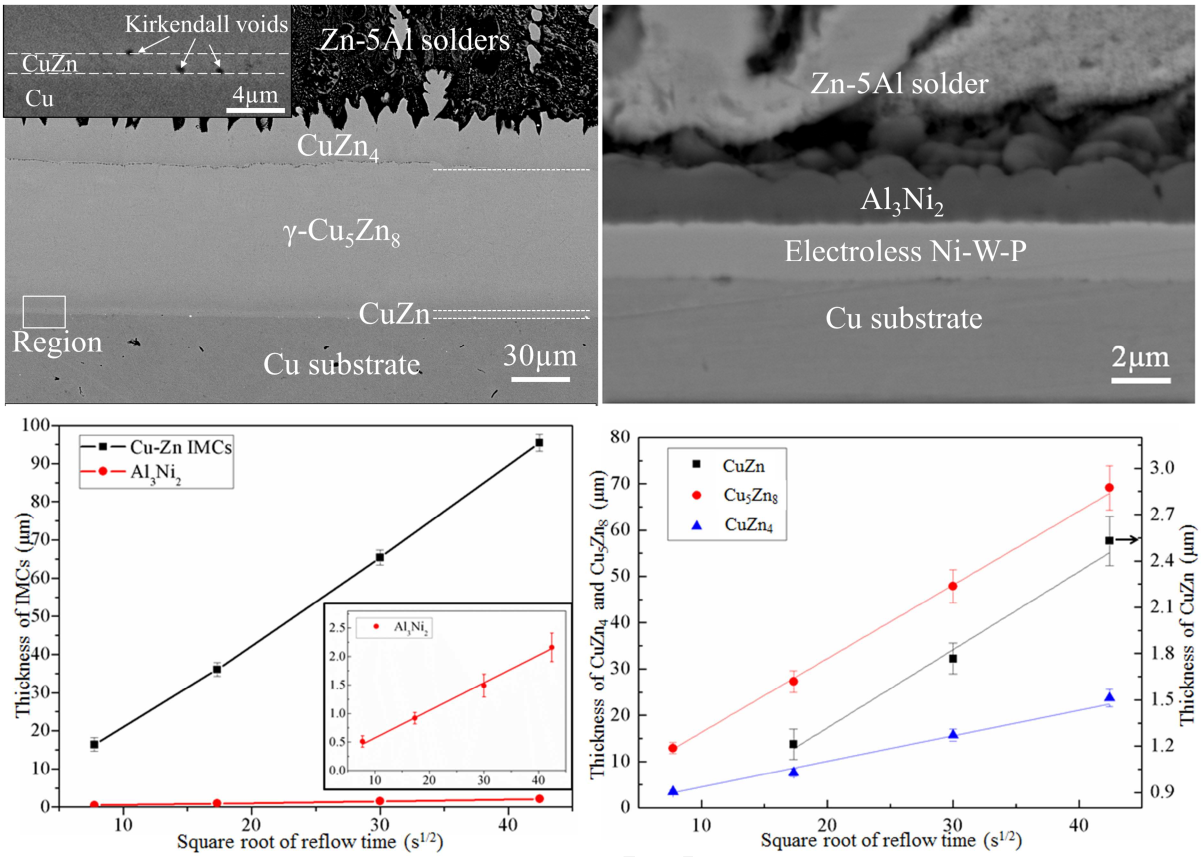
Kirkendall voids
CuZn
Cu
4μm
Zn-5Al solders
CuZn4
γ-Cu5Zn8
CuZn
Region
Cu substrate
30μm
Zn-5Al solder
Al3Ni2
Electroless Ni-W-P
Cu substrate
2μm
Thickness of IMCs (μm)
0
10
20
30
40
50
60
70
80
90
100
Cu-Zn IMCs
Al3Ni2
0.0
0.5
1.0
1.5
2.0
2.5
Square root of reflow time (s1/2)
10
20
30
40
Thickness of CuZn4 and Cu5Zn8 (μm)
Thickness of CuZn (μm)
CuZn
Cu5Zn8
CuZn4
0.9
1.2
1.5
1.8
2.1
2.4
2.7
3.0