Claims

What is claimed:

1. A method of making a semiconductor device, comprising:

providing a first semiconductor die;

disposing a modular interconnect structure laterally with respect to the first semiconductor die;

depositing an encapsulant around the first semiconductor die and modular interconnect structure;

forming a build-up interconnect structure over the first semiconductor die and modular interconnect structure after depositing the encapsulant, wherein a non-routing area over the first semiconductor die remains devoid of the build-up interconnect structure; and

disposing a second semiconductor die over the first semiconductor die, wherein the first semiconductor die or second semiconductor die includes a microelectromechanical device, wherein an active surface of the first semiconductor die is oriented toward an active surface of the second semiconductor die.

2. The method of claim 1, further including forming an interconnect structure over the modular interconnect structure opposite the build-up interconnect structure.

3. The method of claim 1, further including forming a conductive via through the modular interconnect structure.

4. The method of claim 1, further including disposing an interposer between the first semiconductor die and second semiconductor die.

5. The method of claim 1, further including disposing a lid over the second semiconductor die.

6. A method of making a semiconductor device, comprising:

providing a first semiconductor die;

disposing a modular interconnect structure adjacent to the first semiconductor die;

forming a first interconnect structure over the first semiconductor die and modular interconnect structure, wherein a non-routing area over the first semiconductor die remains devoid of the first interconnect structure; and

disposing a second semiconductor die over the first semiconductor die, wherein the first semiconductor die or second semiconductor die includes a microelectromechanical device, and wherein an active surface of the first semiconductor die is oriented toward an active surface of the second semiconductor die.

7. The method of claim 6, further including depositing an encapsulant around the first semiconductor die and modular interconnect structure.

8. The method of claim 6, further including forming a second interconnect structure over the second semiconductor die.

9. The method of claim 6, further including forming a conductive via through the modular interconnect structure.

10. The method of claim 6, wherein an active surface of the first semiconductor die is oriented toward an active surface of the second semiconductor die.

11. The method of claim 6, wherein an active surface of the first semiconductor die is oriented away from an active surface of the second semiconductor die.

12. The method of claim 6, further including disposing an interposer between the first semiconductor die and second semiconductor die.

13. A method of making a semiconductor device, comprising:

providing a first semiconductor die;

disposing a modular interconnect structure adjacent to the first semiconductor die;

depositing a first encapsulant around the first semiconductor die and modular interconnect structure;

forming a first interconnect structure over the first semiconductor die and modular interconnect structure after depositing the encapsulant; and

disposing a second semiconductor die over the first semiconductor die, wherein an active surface of the first semiconductor die is oriented toward an active surface of the second semiconductor die.

14. The method of claim 13, wherein the first semiconductor die or second semiconductor die includes a microelectromechanical device.

15. The method of claim 13, further including depositing a second encapsulant around the second semiconductor die.

16. The method of claim 13, further including forming a second interconnect structure over the second semiconductor die.

17. The method of claim 13, further including forming a conductive via through the modular interconnect structure.

18. A method of making a semiconductor device, comprising:

providing a first semiconductor die;

disposing a modular interconnect structure adjacent to the first semiconductor die;

depositing an encapsulant over the first semiconductor die and modular interconnect structure;

forming a build-up interconnect structure over the encapsulant, first semiconductor die, and modular interconnect structure; and

disposing a second semiconductor die over the first semiconductor die and build-up interconnect structure, wherein the first semiconductor die or second semiconductor die includes a microelectromechanical device, and wherein an active surface of the first semiconductor die is oriented toward an active surface of the second semiconductor die.

19. The method of claim 18, further including depositing an encapsulant around the first semiconductor die and modular interconnect structure.

20. The method of claim 18, further including forming an interconnect structure over the first semiconductor die and modular interconnect structure.

21. The method of claim 18, further including depositing an encapsulant around the second semiconductor die.

22. The method of claim 18, further including forming an interconnect structure over the second semiconductor die.

23. The method of claim 18, further including forming a conductive via through the modular interconnect structure.