Summary

[0006] ~~In one embodiment, t~~The present ~~invention~~ disclosure relates to ~~is~~ an abrasive article including a first abrasive element, a second abrasive element, a resilient element having first and second major surfaces, and a carrier. The first element and the second abrasive element each comprises a first major surface and a second major surface. At least the first major surfaces of the first and second abrasive elements comprise a plurality of precisely shaped features. The abrasive elements comprise substantially inorganic, monolithic structures.

[0006a] In one aspect, the present disclosure relates to an abrasive article comprising: a first abrasive element; a second abrasive element; a resilient element having first and second major surfaces; and a carrier; wherein the first and second abrasive elements each comprises a first major surface and a second major surface; wherein at least the first major surfaces of the first and second abrasive elements comprise a plurality of precisely shaped features; and wherein the abrasive elements comprise substantially inorganic, monolithic structures.

[0007] ~~In another embodiment, t~~The present ~~invention~~ disclosure also relates to ~~is~~ a method of making an abrasive article. The method includes first providing a first abrasive element and a second abrasive element, wherein each of the first and second abrasive elements comprises a first major surface and a second major surface, where at least the first major surfaces include a plurality of precisely shaped features. The method further includes placing the first major surface of the first and second abrasive elements in contact with an alignment plate, providing a resilient element having first and second major surfaces, affixing the first major surface of the resilient element to the second major surfaces of the abrasive elements, providing a fastening element and affixing the second major surface of the resilient element to a carrier through the fastening element. A collective group of features on all the abrasive elements, having a common maximum design feature height of D_o, have a non-coplanarity of less than about 20% of the feature height.

[0007a] In another aspect, the present disclosure relates to a method of making an abrasive article comprising: providing a first abrasive element and a second abrasive element, wherein each of the first and second abrasive elements comprises a first major surface and a second major surface, where at least the first major surfaces comprise a plurality of precisely shaped features; placing the first major surface of the first and second abrasive elements in contact with an alignment plate; providing a resilient element having first and second major surfaces; affixing the first major surface of the resilient element to the second major surfaces of the abrasive elements; providing a fastening element; and affixing the second major surface of the resilient element to a carrier through the fastening element; wherein a collective group of features on all the abrasive elements, having a common maximum design feature height of D_o, have a non-coplanarity of less than about 20% of the feature height.

[0008] ~~In yet another embodiment, t~~The present ~~invention~~ disclosure also relates to ~~is~~ an abrasive article including a first abrasive element, a second abrasive element, a resilient element having first and second major surfaces, and a carrier. The first and second abrasive elements each includes a first major surface and a second major surface. At least the first major surfaces of the first and second abrasive elements include a plurality of precisely shaped features having a diamond coating. The abrasive elements include substantially inorganic, monolithic structures.

[0008a] In another aspect, the present disclosure relates to an abrasive article comprising: a first abrasive element; a second abrasive element; a resilient element having first and second major surfaces; and a carrier; wherein the first and second abrasive elements each comprises a first major surface and a second major surface; wherein at least the first major surfaces of the first and second abrasive elements comprise a plurality of precisely shaped features having a diamond coating; and wherein the abrasive elements comprise substantially inorganic, monolithic structures.

Brief Description of Drawings

[0009] FIG. 1a is a top view of a positive master having pyramid precisely shaped features arranged in a grid pattern used in some of the Examples.

[0010] FIG. 1b is a cross-sectional view of the positive master of FIG. 1a having pyramid precisely shaped features arranged in a grid pattern.

[0011] FIG. 2 is a top view of an abrasive article including abrasive elements of the present invention arranged in a star pattern.

[0012] FIGS. 3a and 3b show the global coplanarity of Example 12 and Comparative Example 13.

[0013] FIG. 4a is a top view of a positive master having pyramid precisely shaped features arranged in a grid pattern used in Example 15.

[0014] FIG. 4b is a cross-sectional view of the positive master of FIG. 4a having pyramid precisely shaped features arranged in a grid pattern.