WHAT IS CLAIMED IS:

1. An abrasive article comprising:

a bonded abrasive body having abrasive particles comprising microcrystalline alumina (MCA) contained within a bond material, wherein the bonded abrasive body has a porosity of at least about 42 vol% of the total volume of the bonded abrasive body, the bonded abrasive body capable of grinding a workpiece comprising metal at a speed of at least about 60 m/s at a material removal rate of at least about 0.4 in^3/min/in (258 mm^3/min/mm).

2. The abrasive article of claim 1 in which the bonded abrasive body has a corner holding factor of not greater than about 0.07 inches (1.78 mm) at a depth of cut of 1.8.

3. The abrasive article as recited in any of claims 1 and 2, wherein the bond material is formed from not greater than about 20 wt% boron oxide (B_2O_3) for the total weight of the bond material.

4. The abrasive article as recited in any of claims 1, 2 and 3, wherein the bond material comprises a ratio of weight percent silicon oxide (SiO_2): weight percent aluminum oxide (Al_2O_3) of not greater than about 3.2.

5. The abrasive article as recited in any of claims 1, 2, 3 and 4, wherein the bond material is formed from not greater than about 3.0 wt% phosphorous oxide (P_2O_5).

6. An abrasive article comprising:

a bonded abrasive body having abrasive particles comprising microcrystalline alumina (MCA) contained within a bond material formed from not greater than about 20 wt% boron oxide (B_2O_3), having a ratio of weight percent silica (SiO_2): weight percent alumina (Al_2O_3) of not greater than about 3.2 (by weight percent) wherein the bonded abrasive body has a porosity of at least about 42 vol% of the total volume of the bonded abrasive body, and the bonded abrasive body is capable of grinding a workpiece comprising metal at a speed of at least about 60 m/s with a depth of cut of at least about 0.003 inches (0.076 mm).

7. The abrasive article as recited in any one of claims 1 and 6, wherein the bonded abrasive body is capable of grinding the workpiece at a maximum power of not greater than about 10 Hp.

8. The abrasive article as recited in any one of claims 1, 6 and 7, wherein the abrasive particles consist essentially of microcrystalline alumina.

9. The abrasive article as recited in any one of claims 1, 6, 7 and 8, wherein the bond material comprises a single phase vitreous material.

10. The abrasive article as recited in any one of claims 1, 6, 7, 8 and 9, wherein the bonded abrasive body comprises a porosity of at least about 43 vol% and not greater than about 70 vol% of the total volume of the bonded abrasive body.

11. The abrasive article as recited in any one of claims 1, 6, 7, 8 and 9, wherein the bonded abrasive body comprises at least about 35 vol% abrasive particles of the total volume of the bonded abrasive body.

12. The abrasive article as recited in any one of claims 1, 6, 7, 8 and 9, wherein the bond material comprises an alkali oxide compound (R_2O) selected from the group of compounds consisting of lithium oxide (Li_2O), sodium oxide (Na_2O), potassium oxide (K_2O), and cesium oxide (Cs_2O) and a combination thereof.

13. The abrasive article as recited in any one of claims 1, 6, 7, 8 and 9, wherein the bond material is formed from at least one alkali oxide compound (R_2O) and at least one alkaline earth oxide compound (RO), wherein the total content of the alkali oxide compound and the alkaline earth oxide compound is not greater than about 20 wt%.

14. The abrasive article as recited in any one of claims 1, 6, 7, 8 and 9, wherein the bond is formed from a composition comprising not greater than about 1 wt% of oxide compounds selected from the group consisting of MnO_2, $ZrSiO_2$, $CoAl_2O_4$, and MgO.

15. An abrasive article comprising:

a bonded abrasive body having abrasive particles comprising microcrystalline alumina (MCA) contained within a bond material formed from not greater than about 20 wt% boron oxide (B_2O_3), having a ratio of weight percent silica (SiO_2): weight

percent alumina (Al_2O_3) of not greater than about 3.2 (by weight percent) wherein the bonded abrasive body has a porosity of at least about 42 vol% of the total volume of the bonded abrasive body, and the bonded abrasive body is capable of grinding a workpiece comprising metal at a speed of at least about 60 m/s with a depth of cut of at least about 0.003 inches (0.076 mm).

WHAT IS CLAIMED IS:

1. An abrasive article comprising:

a bonded abrasive body having abrasive particles comprising microcrystalline alumina (MCA) contained within a single phase vitreous bond material, wherein the bonded abrasive body has a porosity of at least about 42 vol% of the total volume of the bonded abrasive body, the bonded abrasive body capable of grinding a workpiece comprising metal at a speed of at least about 60 m/s at a material removal rate of at least about 0.4 in^3/min/in (258 mm^3/min/mm), wherein the bond material includes at least 45 vol% SiO_2.

2. The abrasive article of claim 1 in which the bonded abrasive body has a corner holding factor of not greater than about 0.07 inches (1.78 mm) at a depth of cut of 1.8.

3. The abrasive article as recited in any of claims 1 and 2, wherein the bond material is formed from not greater than about 20 wt% boron oxide (B_2O_3) for the total weight of the bond material.

4. The abrasive article as recited in any of claims 1, 2 and 3, wherein the bond material comprises a ratio of weight percent silicon oxide (SiO_2): weight percent aluminum oxide (Al_2O_3) of not greater than about 3.2.

5. The abrasive article as recited in any of claims 1, 2, 3 and 4, wherein the bond material is formed from not greater than about 3.0 wt% phosphorous oxide (P_2O_5).

6. An abrasive article comprising:

a bonded abrasive body having abrasive particles comprising microcrystalline alumina (MCA) contained within a single phase vitreous bond material formed from not greater than about 20 wt% boron oxide (B_2O_3) and at least 45 vol% silica (SiO_2), having a ratio of weight percent silica (SiO_2): weight percent alumina (Al_2O_3) of not greater than about 3.2 (by weight percent) wherein the bonded abrasive body has a porosity of at least about 42 vol% of the total volume of the bonded abrasive body, and the bonded abrasive body is capable of grinding a workpiece

comprising metal at a speed of at least about 60 m/s with a depth of cut of at least about 0.003 inches (0.076 mm).

7. The abrasive article as recited in any one of claims 1 and 6, wherein the bonded abrasive body is capable of grinding the workpiece at a maximum power of not greater than about 10 Hp.

8. The abrasive article as recited in any one of claims 1, 6 and 7, wherein the abrasive particles consist essentially of microcrystalline alumina.

9. The abrasive article as recited in any one of claims 1, 6, 7 and 8, wherein the bonded abrasive body comprises a porosity of at least about 43 vol% and not greater than about 70 vol% of the total volume of the bonded abrasive body.

10. The abrasive article as recited in any one of claims 1, 6, 7 and 8, wherein the bonded abrasive body comprises at least about 35 vol% abrasive particles of the total volume of the bonded abrasive body.

11. The abrasive article as recited in any one of claims 1, 6, 7 and 8, wherein the bond material comprises an alkali oxide compound (R_2O) selected from the group of compounds consisting of lithium oxide (Li_2O), sodium oxide (Na_2O), potassium oxide (K_2O), and cesium oxide (Cs_2O) and a combination thereof.

12. The abrasive article as recited in any one of claims 1, 6, 7 and 8, wherein the bond material is formed from at least one alkali oxide compound (R_2O) and at least one alkaline earth oxide compound (RO), wherein the total content of the alkali oxide compound and the alkaline earth oxide compound is not greater than about 20 wt%.

13. The abrasive article as recited in any one of claims 1, 6, 7 and 8, wherein the bond is formed from a composition comprising not greater than about 1 wt% of oxide compounds selected from the group consisting of MnO_2, $ZrSiO_2$, $CoAl_2O_4$, and MgO.

14. An abrasive article comprising:

a bonded abrasive body having abrasive particles comprising microcrystalline alumina (MCA) contained within a single phase vitreous bond material formed from not greater than about 20 wt% boron oxide (B_2O_3) and at least 45 vol% silica (SiO_2),

having a ratio of weight percent silica (SiO_2): weight percent alumina (Al_2O_3) of not greater than about 3.2 (by weight percent) wherein the bonded abrasive body has a porosity of at least about 42 vol% of the total volume of the bonded abrasive body, and the bonded abrasive body is capable of grinding a workpiece comprising metal at a speed of at least about 60 m/s with a depth of cut of at least about 0.003 inches (0.076 mm), wherein the bonded abrasive body has a content of the bond material of not greater than 15 vol% of the total volume of the bonded abrasive body.