cost, for example a machined stainless steel carrier used to support the sintered abrasive plate of a pad conditioner; this can lead to an increase in cost of the abrasive article. Thus, it is desired to provide an abrasive article wherein the abrasive member that contains the working surface can be easily separated from the support substrate, so that a new abrasive member with a fresh working surface can be replaced on the support substrate. In so doing, the support substrate is recovered and reused at considerable cost savings. The present disclosure provides abrasive articles that allow for easy separation of the abrasive member from a support substrate, through the use of magnetic attachment, such that the support substrate can be recovered and reused. The abrasive articles of the present disclosure allow a wide variety of abrasive members fabricated from a large variety of materials, particularly materials that are non-responsive to a magnetic field, e.g. non-ferromagnetic materials, to be magnetically coupled to a third member, e.g. a support substrate. The abrasive articles of the present disclosure may find particular utility as pad conditioners, useful, for examples, in CMP applications. The disclosure further provides methods of separating an abrasive member from an abrasive article and methods of replacing the abrasive member of an abrasive article.

In one aspect, the present disclosure provides an abrasive article comprising:

an abrasive member having a working surface and an exterior attachment surface disposed opposite the working surface, wherein the abrasive member comprises a matrix material and an inorganic material having a Mohs hardness greater than about 7.0;

a magnetic member having opposing first and second major surfaces; and

a third member having a first major surface and a second major surface, wherein the first major surface of the third member faces the second major surface of the magnetic member and wherein the third member comprises a ferromagnetic material and is attached to the magnetic member by a magnetic force;

wherein the first major surface of the magnetic member faces the exterior attachment surface;

wherein the magnetic member is disposed between the abrasive member and the third member; and

wherein the region of the abrasive article between the working surface of the abrasive member and first major surface of the magnetic member is free of a coupling structure that couples the abrasive member to the magnetic member by a magnetic force.

In another aspect, the present disclosure provides an abrasive article comprising:

an abrasive member having a working surface and an exterior attachment surface disposed opposite the working surface, wherein the abrasive member comprises a matrix material and an inorganic material having a Mohs hardness greater than about 7.0; and

a magnetic member having opposing first and second major surfaces;

wherein the first major surface of the magnetic member faces the exterior attachment surface;

What is claimed is:

1. An abrasive article comprising:

an abrasive member having a working surface and an exterior attachment surface disposed opposite the working surface, wherein the abrasive member comprises a matrix material and an inorganic material having a Mohs hardness greater than about 7.0;

a magnetic member having opposing first and second major surfaces; and

a third member having a first major surface and a second major surface, wherein the first major surface of the third member faces the second major surface of the magnetic member and wherein the third member comprises a ferromagnetic material and is attached to the magnetic member by a magnetic force;

wherein the first major surface of the magnetic member faces the exterior attachment surface;

wherein the magnetic member is disposed between the abrasive member and the third member; and

wherein the region of the abrasive article between the working surface of the abrasive member and first major surface of the magnetic member is free of a coupling structure that couples the abrasive member to the magnetic member by a magnetic force.

2. The abrasive article of claim 1, wherein the inorganic material comprises abrasive particles that are at least partially contained in a portion of the matrix material that is proximate the working surface.

3. The abrasive article of claim 1, wherein the inorganic material comprises an inorganic coating disposed on at least a portion of the matrix material that is proximate to the working surface.

4. The abrasive article of claim 1, wherein the inorganic material includes at least one of diamond or diamond like carbon.

5. The abrasive article of claim 1, wherein the matrix material comprises a metal.

6. The abrasive article of claim 1, wherein the matrix material comprises a ceramic.

7. The abrasive article of claim 1, wherein the working surface comprises a plurality of precisely shaped features.

8. The abrasive article of claim 1, further comprising an adhesive member interposed between and in contact with the exterior attachment surface of the abrasive member and the first major surface of the magnetic member, wherein the adhesive member couples the abrasive member to the magnetic member.

9. The abrasive article of claim 1, wherein the magnetic member includes at least one alignment cavity extending into the magnetic member.

10. The abrasive article of claim 1 further comprising at least one alignment pin, wherein the at least one alignment pin extends from the plane of the second major surface of the magnetic member.

11. The abrasive article of claim 9, wherein the third member further comprises at least one alignment pin and wherein each of the at least one alignment pin aligns with and extends into one of the at least one alignment cavity.

12. The abrasive article of claim 10, wherein the third member comprises at least one alignment cavity and wherein each of the at least one alignment pin extends into one of the at least one alignment cavity.

13. The abrasive article of claim 1, wherein the abrasive article includes a release mechanism.

14. A method of separating an abrasive member from an abrasive article comprising:

providing an abrasive article according to claim 1, and

applying a separating force to at least one of the abrasive member, the magnetic member and the third member, wherein the separating force exceeds the magnetic force between the magnetic member and third member causing the abrasive member and attached magnetic member to separate from the third member.

15. A method of replacing the abrasive member of an abrasive article comprising:

providing a first abrasive article according to claim 1,

applying a separating force to at least one of the abrasive member, the magnetic member and the third member of the first abrasive article, wherein the separating force exceeds the magnetic force between the magnetic member and third member causing the abrasive member and attached magnetic member to separate from the third member,

providing a second abrasive article according to claim 1,

positioning the second abrasive article such that the second major surface of the magnetic member of the second abrasive article is proximate to and faces the first major surface of the third member of the first abrasive article, and

attaching the magnetic member of the second abrasive article to the third member of the first abrasive article by a magnetic force.