Claims:

1. A method of preparing a alkaline-earth metal oxide-containing polishing pad useful for polishing at least one of semiconductor, magnetic and optical substrates comprising:

a. introducing a feed stream of gas-filled polymeric microelements into a gas jet, the polymeric microelements having varied density, varied wall thickness and varied particle size, the polymeric microelements having alkaline-earth metal oxide-containing regions distributed on an outer surface of the polymeric microelements, the alkaline-earth metal oxide-containing regions being spaced to coat 1 to 40 percent of the outer surface of the polymeric microelements; and being associated with greater than a 0.1 weight percent total of the following: i) alkaline-earth metal oxide-containing particles having a particle size of greater than 5 μm; ii) alkaline-earth metal oxide-containing regions covering greater than 50 percent of the outer surface of the polymeric microelements; and iii) polymeric microelements agglomerated with alkaline-earth metal oxide-containing-particles to an average cluster size of greater than 120 μm;

b. passing the polymeric microelements in the gas jet adjacent a Coanda block, the Coanda block having a curved wall for separating the polymeric microelements with Coanda effect, inertia and gas flow resistance;

c. separating the i) alkaline-earth metal oxide-containing particles having a particle size of greater than 5 μm; ii) alkaline-earth metal oxide-containing regions covering greater than 50 percent of the outer surface of the polymeric microelements; and iii) polymeric microelements agglomerated with alkaline-earth metal oxide-containing particles to an average cluster size of greater than 120 μm associated with the polymeric microelements from the curved wall of the Coanda block to clean the polymeric microelements;

d. collecting the polymeric microelements with less than 0.1 weight percent total of the polymeric microelements being associated with i) alkaline-earth metal oxide-containing particles having a particle size of greater than 5 μm; ii) alkaline-earth metal oxide-containing regions covering greater than 50 percent of the outer surface of the polymeric microelements; and iii) polymeric microelements agglomerated with alkaline-earth metal oxide-containing particles to an average cluster size of greater than 120 μm; and

e. inserting the polymeric microelements into a polymeric matrix to form a polishing pad.

2. The method of claim 1 wherein the polymeric microelements include alkaline-earth metal oxide-containing fines and including the additional step of separating the polymeric microelements from the alkaline-earth metal oxide-containing fines with the wall of the Coanda block.

3. The method of claim 2 wherein the separating of the alkaline-earth metal oxide-containing fines and separating the i) alkaline-earth metal oxide-containing particles having a particle size of greater than 5 μm; ii) alkaline-earth metal oxide-containing regions covering greater than 50 percent of the outer surface of the polymeric microelements; and iii) polymeric microelements agglomerated with alkaline-earth metal oxide-containing particles to an average cluster size of greater than 120 μm associated with the polymeric microelements occur in a single step.

4. The method of claim 1 including the additional step of directing two additional gas streams into the polymeric microelements to facilitate separating the polymeric microelements from the i) alkaline-earth metal oxide-containing particles having a particle size of greater than 5 μm; ii) alkaline-earth metal oxide-containing regions covering greater than 50 percent of the outer surface of the polymeric microelements; and iii) polymeric microelements agglomerated with alkaline-earth metal oxide-containing particles to an average cluster size of greater than 120 μm associated with the polymeric microelements.

5. The method of claim 1 wherein the inserting the polymeric microelements into a polymeric matrix includes mixing the polymeric microelements into a liquid polymer matrix.

6. A method of preparing a alkaline-earth metal oxide-containing polishing pad useful for polishing at least one of semiconductor, magnetic and optical substrates, the alkaline earth element being calcium oxide, magnesium oxide or a mixture of calcium and magnesium oxides, comprising:

a. introducing a feed stream of gas-filled polymeric microelements into a gas jet, the polymeric microelements having varied density, varied wall thickness and varied particle size, the polymeric microelements having alkaline-earth metal oxide-containing regions distributed on an outer surface of the polymeric microelements, the alkaline-earth metal oxide-containing regions being spaced to coat less than 50 percent of the outer surface of the polymeric microelements; and being associated with greater than a 0.2 weight percent total of the following: i) alkaline-earth metal oxide-containing particles having a particle size of greater than 5 μm; ii) alkaline-earth metal oxide-containing regions covering greater than 50 percent of the outer surface of the polymeric microelements; and iii) polymeric microelements agglomerated with alkaline-earth metal oxide-containing particles to an average cluster size of greater than 120 μm;

b. passing the polymeric microelements in the gas jet adjacent a Coanda block, the Coanda block having a curved wall for separating the polymeric microelements with Coanda effect, inertia and gas flow resistance;

c. separating the i) alkaline-earth metal oxide-containing particles having a particle size of greater than 5 μm; ii) alkaline-earth metal oxide-containing regions covering greater than 50 percent of the outer surface of the polymeric microelements; and iii) polymeric microelements agglomerated with alkaline-earth metal oxide-containing particles to an average cluster size of greater than 120 μm associated with the polymeric microelements from the curved wall of the Coanda block to clean the polymeric microelements;

d. collecting the polymeric microelements with less than 0.1 weight percent total of the polymeric microelements being associated with i) alkaline-earth metal oxide-containing particles having a particle size of greater than 5 μm; ii) alkaline-earth metal oxide-containing regions covering greater than 50 percent of the outer surface of the polymeric microelements; and iii) polymeric microelements agglomerated with alkaline-earth metal oxide-containing particles to an average cluster size of greater than 120 μm; and

e. inserting the polymeric microelements into a polymeric matrix to form a polishing pad.

7. The method of claim 6 wherein the polymeric microelements include alkaline-earth metal oxide-containing fines and including the additional step of separating the polymeric

microelements from the alkaline-earth metal oxide-containing fines with the wall of the Coanda block.

8. The method of claim 7 wherein the separating of the alkaline-earth metal oxide-containing fines and separating the i) alkaline-earth metal oxide-containing particles having a particle size of greater than 5 μm; ii) alkaline-earth metal oxide-containing regions covering greater than 50 percent of the outer surface of the polymeric microelements; and iii) polymeric microelements agglomerated with alkaline-earth metal oxide-containing particles to an average cluster size of greater than 120 μm associated with the polymeric microelements occur in a single step.

9. The method of claim 6 including the additional step of directing two additional gas streams into the polymeric microelements to facilitate separating the i) alkaline earth metal oxide-containing particles having a particle size of greater than 5 μm; ii) alkaline-earth metal oxide-containing regions covering greater than 50 percent of the outer surface of the polymeric microelements; and iii) polymeric microelements agglomerated with alkaline-earth metal oxide-containing particles to an average cluster size of greater than 120 μm associated with the polymeric microelements.

10. The method of claim 6 wherein the inserting the polymeric microelements into a polymeric matrix includes mixing the polymeric microelements into a liquid polymer matrix and casting the liquid polymer matrix with the polymeric microelements into a mold.

The invention claimed is:

1. A method of preparing a alkaline-earth metal oxide-containing polishing pad useful for polishing at least one of semiconductor, magnetic and optical substrates comprising:
a. introducing a feed stream of gas-filled polymeric microelements into a gas jet, the polymeric microelements having varied density, varied wall thickness and varied particle size, the polymeric microelements having alkaline-earth metal oxide-containing regions distributed on an outer surface of the polymeric microelements, the alkaline-earth metal oxide-containing regions being spaced to coat 1 to 40 percent of the outer surface of the polymeric microelements; and being associated with greater than a 0.1 weight percent total of the following:
i) alkaline-earth metal oxide-containing particles having a particle size of greater than 5 μm; ii) alkaline-earth metal oxide-containing regions covering greater than 50 percent of the outer surface of the polymeric microelements; and polymeric microelements agglomerated with alkaline-earth metal oxide-containing-particles to an average cluster size of greater than 120 μm ;
b. passing the polymeric microelements in the gas jet adjacent a Coanda block, the Coanda block having a curved wall for separating the polymeric microelements with Coanda effect, inertia and gas flow resistance;
c. separating the i) alkaline-earth metal oxide-containing particles having a particle size of greater than 5 μm ; ii) alkaline-earth metal oxide-containing regions covering greater than 50 percent of the outer surface of the polymeric microelements; and iii) polymeric microelements agglomerated with alkaline-earth metal oxide-containing particles to an average cluster size of greater than 120 μm associated with the polymeric microelements from the curved wall of the Coanda block to clean the polymeric microelements;
d. collecting the polymeric microelements with less than 0.1 weight percent total of the polymeric microelements being associated with i) alkaline-earth metal oxide-containing particles having a particle size of greater than 5 μm ; ii) alkaline-earth metal oxide-containing regions covering greater than 50 percent of the outer surface of the polymeric microelements; and iii) polymeric microelements agglomerated with alkaline-earth metal oxide-containing particles to an average cluster size of greater than 120 μm; and
e. inserting the polymeric microelements into a polymeric matrix to form a polishing pad.

2. The method of claim 1 wherein the polymeric microelements include alkaline-earth metal oxide-containing fines and including the additional step of separating the polymeric microelements from the alkaline-earth metal oxide-containing fines with the wall of the Coanda block.

3. The method of claim 2 wherein the separating of the alkaline-earth metal oxide-containing fines and separating the i) alkaline-earth metal oxide-containing particles having a particle size of greater than 5 μm ; ii) alkaline-earth metal oxide-containing regions covering greater than 50 percent of the outer surface of the polymeric microelements; and iii) polymeric microelements agglomerated with alkaline-earth metal oxide-containing particles to an average cluster size of greater than 120 μm associated

with the polymeric microelements occur in a single step.

4. The method of claim 1 including the additional step of directing two additional gas streams into the polymeric microelements to facilitate separating the polymeric microelements from the i) alkaline-earth metal oxide-containing particles having a particle size of greater than 5 μm ; ii) alkaline-earth metal oxide-containing regions covering greater than 50 percent of the outer surface of the polymeric microelements; and iii) polymeric microelements agglomerated with alkaline-earth metal oxide-containing particles to an average cluster size of greater than 120 μm associated with the polymeric microelements.

5. The method of claim 1 wherein the inserting the polymeric microelements into a polymeric matrix includes mixing the polymeric microelements into a liquid polymer matrix.

6. A method of preparing a alkaline-earth metal oxide-containing polishing pad useful for polishing at least one of semiconductor, magnetic and optical substrates, the alkaline earth element being calcium oxide, magnesium oxide or a mixture of calcium and magnesium oxides, comprising:

a. introducing a feed stream of gas-filled polymeric microelements into a gas jet, the polymeric microelements having varied density, varied wall thickness and varied particle size, the polymeric microelements having alkaline-earth metal oxide-containing regions distributed on an outer surface of the polymeric microelements, the alkaline-earth metal oxide-containing regions being spaced to coat less than 50 percent of the outer surface of the polymeric microelements; and being associated with greater than a 0.2 weight percent total of the following: i) alkaline-earth metal oxide-containing particles having a particle size of greater than 5 μm ; ii) alkaline-earth metal oxide-containing regions covering greater than 50 percent of the outer surface of the polymeric microelements; and iii) polymeric microelements agglomerated with alkaline-earth metal oxide-containing particles to an average cluster size of greater than 120 μm ;

b. passing the polymeric microelements in the gas jet adjacent a Coanda block, the Coanda block having a curved wall for separating the polymeric microelements with Coanda effect, inertia and gas flow resistance;

c. separating the i) alkaline-earth metal oxide-containing particles having a particle size of greater than 5 μm ; ii) alkaline-earth metal oxide-containing regions covering greater than 50 percent of the outer surface of the polymeric microelements; and iii) polymeric microelements agglomerated with alkaline-earth metal oxide-containing particles to an average cluster size of greater than 120 μm associated with the polymeric microelements from the curved wall of the Coanda block to clean the polymeric microelements;

d. collecting the polymeric microelements with less than 0.1 weight percent total of the polymeric microelements being associated with i) alkaline-earth metal oxide-containing particles having a particle size of greater than 5 μm ; ii) alkaline-earth metal oxide-containing regions covering greater than 50 percent of the outer surface of the polymeric microelements; and iii) polymeric microelements

agglomerated with alkaline-earth metal oxide-containing particles to an average cluster size of greater than 120 μm ; and
e. inserting the polymeric microelements into a polymeric matrix to form a polishing pad.

7. The method of claim 6 wherein the polymeric microelements include alkaline-earth metal oxide-containing fines and including the additional step of separating the polymeric microelements from the alkaline-earth metal oxide-containing fines with the wall of the Coanda block.

8. The method of claim 7 wherein the separating of the alkaline-earth metal oxide-containing fines and separating the i) alkaline-earth metal oxide-containing particles having a particle size of greater than 5 μm ; ii) alkaline-earth metal oxide-containing regions covering greater than 50 percent of the outer surface of the polymeric microelements; and iii) polymeric microelements agglomerated with alkaline-earth metal oxide-containing particles to an average cluster size of greater than 120 μm associated with the polymeric microelements occur in a single step.

9. The method of claim 6 including the additional step of directing two additional gas streams into the polymeric microelements to facilitate separating the i) alkaline earth metal oxide-containing particles having a particle size of greater than 5 μm ; ii) alkaline-earth metal oxide-containing regions covering greater than 50 percent of the outer surface of the polymeric microelements; and iii) polymeric microelements agglomerated with alkaline-earth metal oxide-containing particles to an average cluster size of greater than 120 μm associated with the polymeric microelements.

10. The method of claim 6 wherein the inserting the polymeric microelements into a polymeric matrix includes mixing the polymeric microelements into a liquid polymer matrix and casting the liquid polymer matrix with the polymeric microelements into a mold.