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[54] **APPARATUS FOR POLISHING A DIAMOND OR CARBON NITRIDE FILM BY REACTION WITH OXYGEN TRANSPORTED TO THE FILM THROUGH A SUPERIONIC CONDUCTOR IN CONTACT WITH THE FILM**

[75] Inventors: **Jerome J. Cuomo**, Lincolndale, N.Y.;
Joseph E. Yehoda, Fogelsville, Pa.

[73] Assignee: **International Business Machines Corporation**, Armonk, N.Y.

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Related U.S. Application Data

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216/81; 427/343; 427/533; 427/539

[58] Field of Search 156/345; 216/63,
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Primary Examiner—Terry J. Owens

Attorney, Agent, or Firm—Daniel P. Morris; Sterne, Kessler, Goldstein & Fox

[57] ABSTRACT

Apparatus and process for polishing a diamond or carbon nitride film by reaction of the film with oxygen anions at the interface between the film and a superionic conductor (e.g., yttria stabilized zirconia) placed in contact with the film. Oxygen anions produced by the formation of vacancies in the superionic conductor are transported to the interface under the influence of a chemical gradient and react with the diamond or carbon nitride. Application of an electric field and/or heat can be used to increase the oxygen partial pressure on the side of the interface opposite the film. An oxygen plasma can be supplied to the superionic conductor such that oxygen ions from the plasma transpire through the superionic conductor to the interface and react with the diamond or carbon nitride.

9 Claims, 5 Drawing Sheets

