

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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Title: BOND COAT FOR SILICON BASED SUBSTRATES

DECLARATION OF DR. DAVID R. CLARKE

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I. Introduction

I, David R. Clarke, declare as follows:

1. I have been retained on behalf of United Technologies Corporation to offer technical opinions relating to U.S. Patent No. 7,060,360 (the '360 Patent), and prior art references relating to its subject matter.

II. Qualifications

2. My name is Dr. David R. Clarke. I am the Extended Tarr Family Chair of Materials at Harvard University. My current *curriculum vitae* is attached and some highlights follow.

3. I earned my B.Sc. (1968) with First Class Honors in Applied Sciences from Sussex University in England and my Ph.D. (1974) in Physics from Cambridge University, England. I carried out research on high temperature silicon-containing materials and zirconia materials at Rockwell International Science Center from 1977-1982. After employment in various capacities related to materials research at IBM Research Division, Yorktown Heights, NY, I was subsequently a Professor of Materials and Professor of Mechanical Engineering at the University of California, Santa Barbara (UCSB), from 1990-2009, and served as the Chair of the Materials Department from 1991-1998. I have been a Professor of Materials and Applied Physics at Harvard University since 2009.

4. My record of professional service includes recognitions from several professional organizations in my field of expertise. I was elected to the National Academy of Engineering in 1999. I was named a Distinguished Life Member of the American Ceramic Society (ACS) in 2009, and have been a Fellow of the American Physical Society since 1986 and of the ACS since 1985. I have been the recipient of a number of awards from the ACS, including James Mueller Award from the Engineering Ceramics Division of the ACS in 2014, the Edward C. Henry Award from the Electronics Division of the ACS in 1999, and the Sosman Memorial Award from the ACS in 1999. I am the author of a scientific paper that was identified as one of the 11 most significant papers in the 110 years of publication of the journal *Ceramics*.¹ I have served as an editor for the *Annual Reviews of Materials Research* since 1997 and as an associate editor for the *Journal of the American Ceramic Society* since 1986.

5. My work at Rockwell International, IBM, UCSB, and Harvard University has appeared in more than 400 refereed and archival publications on which I am author or co-author. All publications are listed on my *curriculum vitae*. However, a few examples of recent publications that involve thermal barrier coatings

¹ D.R. Clarke, On the Equilibrium Thickness of Intergranular Glass Phases in Ceramic Materials, 70 *Journal of the American Ceramic Society*. 15-22 (1987).

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