

UNIVERSITY OF CALIFORNIA, IRVINE

THE DEPARTMENT OF MATERIALS SCIENCE AND ENGINEERING

Is Proud to Host a Seminar by:

DISTINGUISHED PROFESSOR EMERITUS
JAMES F. SHACKELFORD

Dept. of Materials Science and Engineering
University of California, Davis

Thursday, January 26, 2023

2:00-3:20 PM

Location:

McDonnell Douglas Engineering Auditorium

THE SCIENCE OF GLASS AND THE GLASS OF WINE

Abstract: The United Nations designated 2022 as The International Year of Glass, in honor of the many essential roles that this engineered material plays in modern technology and our daily lives, from fiber optic communication to the faces of our cell phones to the windows in our homes, offices, and automobiles. In this seminar, I look back at that celebration with a personal overview of the science of glass as it has developed over the past century. Building on Zachariassen's 1932 model of the random network structure of amorphous silicates, my PhD thesis nearly 40 years later focused on the transport of gases through glass, looking specifically at the solubility of gasses in vitreous silica. I found that solubility could be nicely modeled with statistical mechanics, providing quantitative values for the size distribution of interstices in the glass. This information was timely as such medium range order was of great interest in the 1970s and 1980s. I continued to focus on this topic and its applications for the next 40 years during my time on the faculty at the University of California, Davis. Much of this work is summarized in a 2011 review paper.¹

Ironically, the topic of gas transport arose in a very different context when my wife, Penelope, and I produced a book for Wiley/ACerS on the intersection of the glass and wine industries.² This was a natural topic for us, given our wine travels (often in conjunction with attending glass conferences around the world) and the fact that UC Davis is home to the leading wine program in America. The *lack of oxygen transport*, as well as culture and tradition, have made glass bottles the standard container for wine for centuries. So, the second half of this seminar will look at the way in which glassware plays a central role in the production, transportation, and consumption of wine.

Bio: James F. Shackelford is Distinguished Professor Emeritus in the Department of Materials Science and Engineering at the University of California, Davis and a Visiting Professor at the Department of Materials Science and Engineering at the University of California, Irvine. He arrived at UC Davis after BS and MS degrees at the University of Washington, Seattle, a PhD degree at the University of California, Berkeley and a postdoctoral fellowship at McMaster University in Canada. Of his more than 150 publications, he is the author of *Introduction to Materials Science for Engineers* now in its 9th Edition and which has been translated into Chinese, German, Italian, Japanese, Korean, Portuguese, and Spanish. He is also a co-editor of the *CRC Materials Science and Engineering Handbook* now in its 4th Edition and the co-author of *The Glass of Wine*.

¹J.F. Shackelford, *Intl. J. Appl. Glass Sci.*, 2 85-95 (2011).

²J.F. Shackelford and P.L Shackelford, *The Glass of Wine*, Wiley/ACerS (2018).