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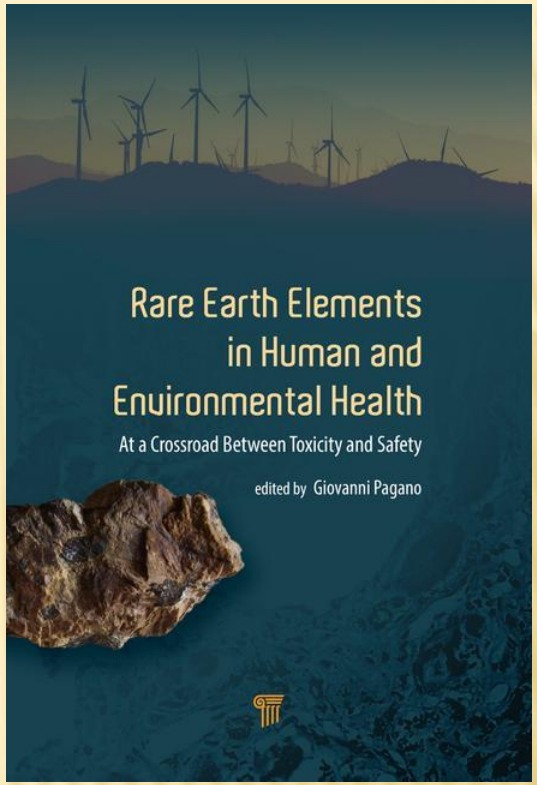

Cerium Oxide Nanoparticles-associated Oxidant and Antioxidant Effects and Mechanism. In "Rare Earth Elements in Human and Environmental Health: At Crossroads between Toxicity and Safety", edited by Pagano, G., Pan Stanford Publishing.

LILY L. WONG, PH.D., ASSISTANT PROFESSOR OF RESEARCH, DEPT. OF OPHTHALMOLOGY, COLLEGE OF MEDICINE, DEAN MCGEE EYE INSTITUTE FACULTY

BOOK CHAPTER AUTHOR

CONTENT OF BOOK CHAPTER: CERIUM OXIDE NANOPARTICLES–ASSOCIATED OXIDANT AND ANTIOXIDANT EFFECTS AND MECHANISMS

- Introduction
- Physicochemical Properties and Catalytic Activities of Nanoceria Are Dictated by Their Synthesis Methods
- Biological Effects of Nanoceria: Antioxidative, Oxidative, and Modulation of Oxygen Level
- Catalytic Activity of Nanoceria in Biological Tissues
- Molecular Mechanisms of Nanoceria in Biological Systems
- Conclusion
- Acknowledgments

AUTHOR BIO

Dr. Wong is a cross-disciplinary idea synthesizer. Trained as a fruit fly developmental biologist, she conducted research on developmental programming in slime mold, chick limb buds, and the developing retinas of frogs and rats. During the past six years, Dr. Wong has focused on developing the redox-active cerium oxide nanoparticles as ophthalmic therapeutics in the treatment of blinding retinal diseases in rodent models. Besides conducting research, Dr. Wong manages an imaging core facility and has trained over 265 individuals to effectively use the different imaging equipment in the facility to advance their research for the past 13 years. The passion she has for looking at small beautiful things has led her to photograph bigger things. She loves revealing the beauty in things and people she counters.

A FEW FIGURES FROM THE BOOK CHAPTER

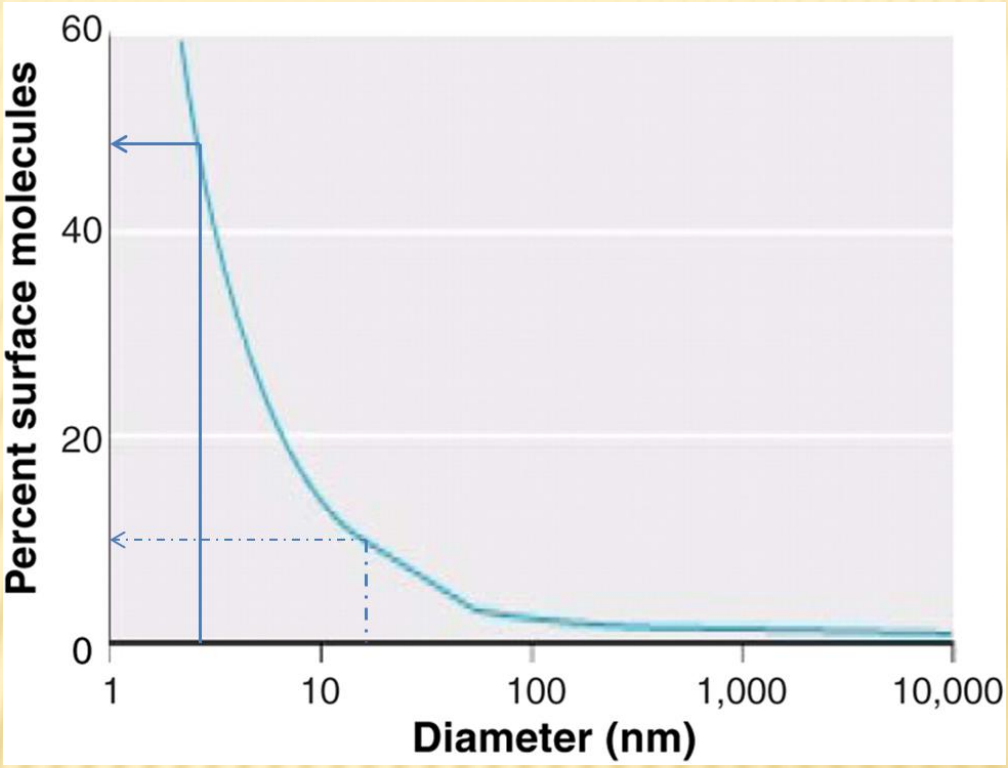

Figure 3.1 The inverse relationship between particle size and the number of surface molecules. Modified from Refs. [42, 43]. The relative number of surface molecules of a 30 nm particle is about 10%,whereas the percentage jumps to 50% for a 3 nm particle.

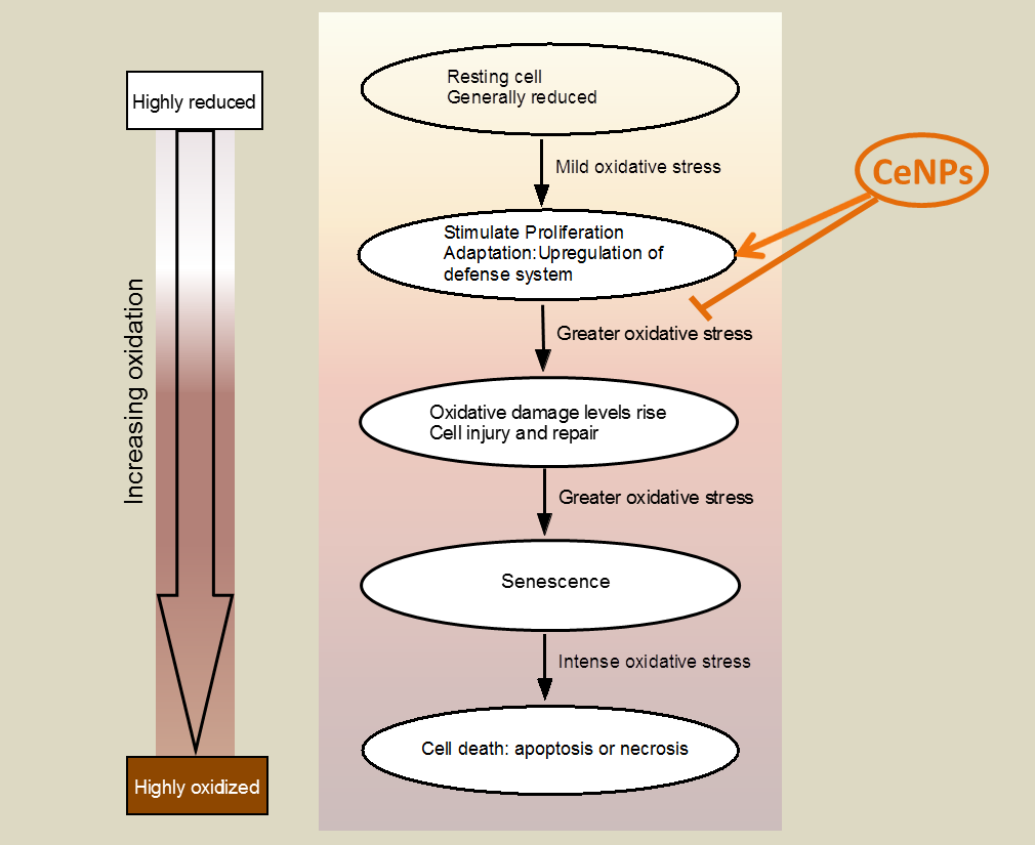

Figure 3.3 How cells respond to oxidative stress and the postulated cellular actions of CeNPs in reducing oxidative stress. In healthy and highly reduced cells, the radical scavenging and/or oxygen-modulating effects of CeNPs cause a mild oxidative stress; cells respond by upregulating a selective array of beneficial adaptive stress responses (a.k.a., hormetic responses) to prepare cells for future greater oxidative insults. The consequence is the survival of these cells from normally irreparable oxidative damages. Modified from Ref. [22] by permission of Oxford University Press.

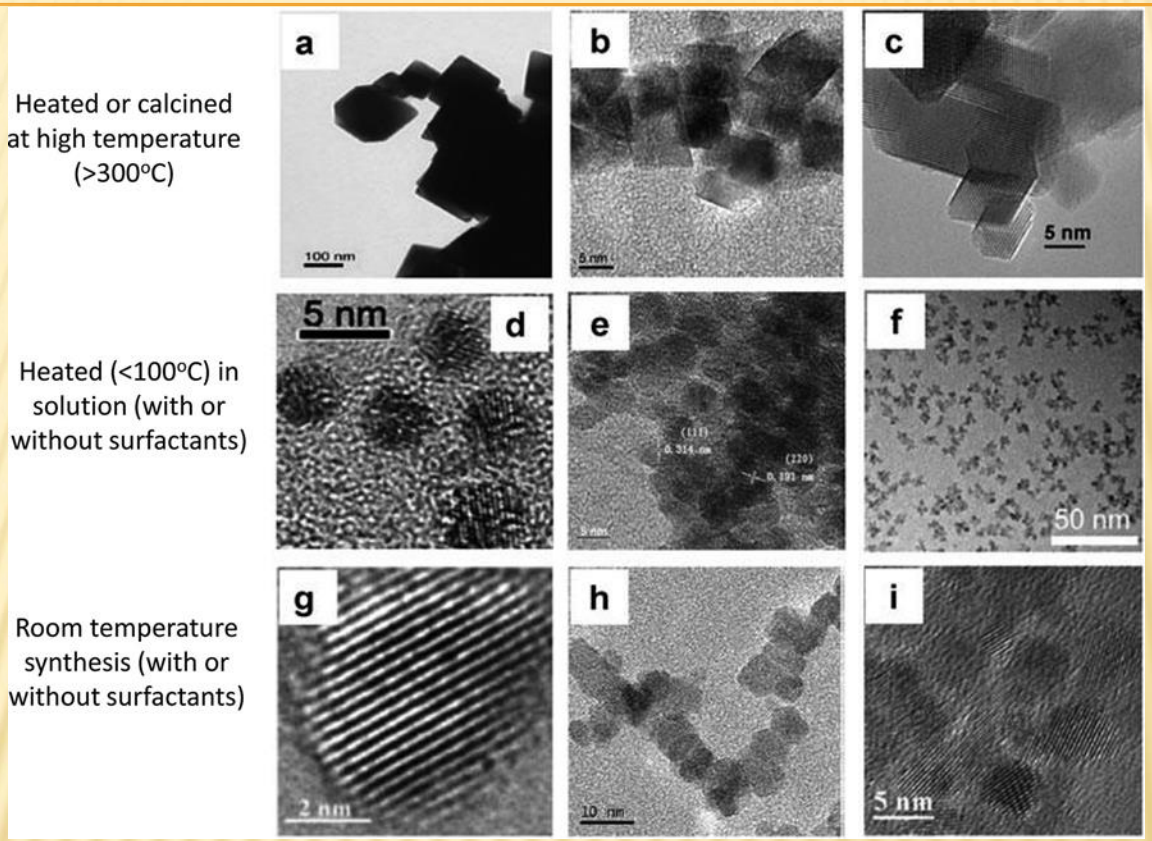

Figure 3.4 TEM images of CeNPs grouped according to the temperature used during synthesis. Group 1: High temperature (a–c); Group 2: Heated in solvents (d–f); and Group 3: Room temperature (g–i). Reprinted with permission from Ref. [26], Copyright 2012, John Wiley and Sons.