


## D.D.L. CHUNG-UNIVERSITY AT BUFFALO

# STRUCTURAL SELF-SENSING

STRUCTURAL SELF-SENSING BASED ON MEASURING THE RESISTANCE, CAPACITANCE OR INDUCTANCE OF THE STRUCTURAL MATERIAL, WITHOUT SENSOR INCORPORATION

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## ABSTRACT

Structural self-sensing refers to a structural material sensing itself without sensor incorporation. Compared to sensor incorporation, advantages include low cost, high durability, large sensing volume and the mechanical properties being not degraded. The self-sensing ability makes the structural material multifunctional. Structural self-sensing involving resistance measurement has been studied for decades, but recent work has extended it from resistance measurement to capacitance or inductance measurement. Resistance or inductance measurement is applicable only to conductive materials (e.g., carbon fiber composites), but capacitance measurement is broadly applicable to conductive and nonconductive materials. The effect of strain or damage on the resistivity is the basis of strong resistance-based sensing ability. The effect of strain or damage on the permittivity is the main basis of strong capacitance-based sensing. The effect of shape-changing deformation (e.g., bending) on the inductance is the main basis of inductance-based sensing.


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Professor Chung of University at Buffalo, The State University of New York, received her Ph.D. in Materials Science from Massachusetts Institute of Technology

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Professor Chung of University at Buffalo, The State University of New York, received her Ph.D. degree in Materials Science from Massachusetts Institute of Technology under the late Professor M.S. Dresselhaus, and her B.S. degree from Caltech. She is a pioneer and international leader in the field of multifunctional structural materials (best known for the invention of smart concrete) and has authored or coauthored over 600 archival journal papers and 10 books. Chung is Member of American Academy of Arts and Sciences (elected in 2023), Fellow of ASM International, and Fellow of American Carbon Society. She received the Pettinos Award (an international research award) from the American Carbon Society, and an Honorary Doctorate Degree from University of Alicante, Spain. She is ranked by the 2022 Stanford University study to be 13th among 315,721 materials scientists in the world (living and deceased), 10th among those that are living, and 1st among those that are female. Her Google Scholar h-index is 110, with 44,333 citations (as viewed on July 18, 2023).