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Magnetic and Structural Properties of Doped Barium Hexaferrite Films Formed by Aerosol Deposition for Microwave Absorption[1]

CHRISTOPHER GONZALEZ, Physics Department, California State University Long Beach, SCOOTER JOHNSON, Multifunction Materials Branch, Naval Research Laboratory — The focus of this research is to verify that magnetic and structural properties of a proprietary doped barium hexaferrite material, H18 produced by *Temex Ceramics*, are preserved after films are created using aerosol deposition. There has not been any published research or reports characterizing the properties of Temex H18; this work fills that void. Magnetic and structural properties have been characterized and compared between the starting powder, pressed and sintered pucks, and the resulting films. Film deposition is achieved by aerosolizing the powder in a chamber and accelerating into the deposition chamber containing the substrate held at a much lower pressure. The as-received particles have an approximate particle size of 700 nm, The pressure difference created between the two chambers accelerates the particles through the deposition chamber where they collide with the substrate and fracture into particles approximately 200 nm in diameter and adhere to the substrate. Barium hexaferrite is a material with electromagnetic properties that allow it to resonate and absorb electromagnetic radiation. A scanning electron microscope has been used to measure approximate particle sizes of the raw starting powder, deposited films, compressed powder, and annealed compressed powder. X-Ray Diffraction has been used to compare features of the starting powder and deposited films. Hysteresis curves were generated of the samples using a Vibrating Sample Magnetometer to analyze the coercivity, magnetization saturation, and remanence. This paper will present results from this effort and discuss similarities and differences in magnetic properties between the starting powder and resulting films. Additional work is underway to demonstrate the applicability of the deposited powder as an absorber using a custom waveguide setup.

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