ADVANCED STRUCTURAL AND TOPOGRAPHICAL INSIGHTS INTO DIFFERENT STAGES OF MUTHUCHIPPI PARPAM USING FESEM AND HRTEM ANALYSIS

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ABSTRACT

Pearl Oyster Shells (Muthuchippi) are widely used in Siddha medicine for their therapeutic properties, primarily due to their high calcium content and bioactive compounds. This study aimed to analyze the topographic morphology and elemental composition of Muthuchippi Parpam (ash) at different processing stages. Field emission scanning electron microscopy revealed a progressive reduction in particle size, resulting in nano-sized particles with irregular, sheet-like structures. High-resolution transmission electron microscopy showed the nano-range size (94.15 ± 10.54 nm) and crystalline structure, while selected area electron diffraction indicated well-defined bright spots and diffraction rings. Energy dispersive spectroscopy identified calcium as the dominant element (70.66–75.54 wt. %) with notable copper presence (24–28.81 wt. %), minor zinc and selenium impurities, and no detectable magnesium. These findings highlight the successful transformation of oyster shells into a bioactive nanostructured material (Muthuchippi Parpam), enhancing its potential for Siddha medicinal applications.