

# SYNTHESIS AND INVESTIGATION OF YTTRIUM IRON GARNET, YTTRIUM AND TERBIUM IRON PEROVSKITE NANOTUBES

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Various garnet and perovskite structures have garnered a lot of interest in the scientific community lately. This is mainly due to their applicability in a wide variety of fields and often interesting properties. Some garnets, for example, show a lot of promise as potential magneto-optical materials [1], while perovskites are considered some of the most versatile structures in general [2, 3], finding use as superconductors [4], potential multiferroics [5] and sensors [6] among many others. However, there are numerous problems that still need to be solved in order to reach more mainstream technological use for these materials. One of these drawbacks is synthesis – often complex and expensive procedures are involved in the synthesis of these structures [7]. Finding simpler synthesis and structurization methods, therefore, is very important.

In this study, the precursor solutions were prepared by dissolving stoichiometric amounts yttrium (or terbium) nitrate and iron nitrate in distilled water, then adding ethylene glycol as a complexing agent. Some of this solution was then used to create nanotubes. This was achieved by using polycarbonate membranes with a pore diameter of 0.2  $\mu\text{m}$ . The membranes were submerged in the solutions and soaked for about 1 minute, carefully moving them about, after which they were removed (excess liquid absorbed with paper), then left to dry for 10 minutes. This procedure was repeated 5 times, to achieve a good filling of the pores. The prepared wet membranes were placed on silicon, then sintered at two different temperatures – 550°C and 800°C. X-ray diffraction analysis and scanning electron microscopy was then used to identify the crystal structure and the parameters of the nanotubes. The results obtained showed that nanotube structure was formed.

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