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Obtaining Ce_2O_2S material via time- and energy-saving microwave-assisted synthesis

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Luminescent materials are of great interest in the technological field due to their ability to emit light when excited by an energy source, finding applications in areas such as lighting, LEDs, lasers, and sensors. Rare-earth oxysulfides stand out for their high chemical and thermal stability, as well as their ability to effectively incorporate lanthanide ions, resulting in excellent photonic performance. In this work, the synthesis of Ce_2O_2S was adapted from the conventional method in a resistive furnace to microwave-assisted solid synthesis (MASS). This new method of obtaining this material proved advantageous by significantly reducing the synthesis time and requiring less energy, while producing the Ce_2O_2S lattice with high purity and crystallinity, and promoting the formation of structural defects. Additionally, this lattice exhibits photoluminescence, with emission in the red region around 600 nm when excited by ultraviolet radiation under low temperature, making it suitable for application in thermometry. The use of microwaves in the synthesis of luminescent materials not only enhances process efficiency but also opens new perspectives for the development of compounds with optimized properties for advanced applications.

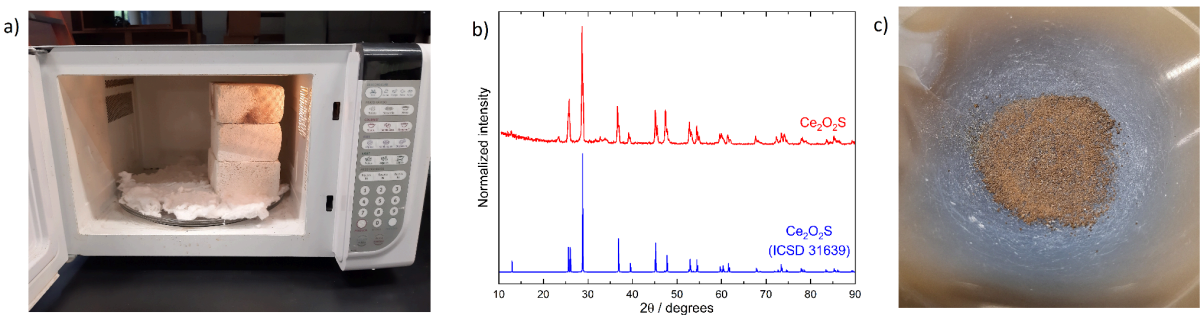

Figure 1: a) Apparatus used in microwave-assisted solid synthesis; b) X-ray diffractogram of the synthesized Ce_2O_2S; c) Synthesized cerium(III) oxysulfide.

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