OBJECTIVE OF THE STUDY

- Understand the formation mechanisms of the hierarchical europium doped yttrium oxide core / silver shell nanostructures and contribute to the luminescence mechanism and metal/inorganic interface properties.
- Surface plasmon resonance enhancement of luminescence efficiency intensity by optimized Ag incorporation.

EXPERIMENTAL METHODS

Synthesis

Ultrasonic Spray Pyrolysis

Heat Treatment

Various heat treatment conditions
- No heat treatment (a.p.)
- 2 hours
- 12 hours

Characterization
- XRD (crystal structure, lattice parameters)
- SEM/TEM: morphology, microstructure
- PL: PL efficiency

Ag effect on microstructure

- 1, 2.5 and 5 wt. % Ag concentrations exhibited target morphology; dense spherical shape and homogenous size distribution.
- More than 5 % Ag results in agglomeration which is detrimental to surface plasmon enhancement.

Ag and heat treatment effect on crystal structure

<table>
<thead>
<tr>
<th>Crystal structure</th>
<th>1% Ag (a.p.)</th>
<th>1% Ag (2h)</th>
<th>1.5% Ag (a.p.)</th>
<th>2.5% Ag (a.p.)</th>
<th>5% Ag (a.p.)</th>
<th>5% Ag (2h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cubic, Ia-3</td>
<td>10.629(5)</td>
<td>10.6199(2)</td>
<td>10.6257(6)</td>
<td>10.6209(2)</td>
<td>10.6248(5)</td>
<td>10.6193(1)</td>
</tr>
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</tbody>
</table>

Ag and heat treatment effect on photoluminescence

- Among a.p. samples, PL emission intensity increase with decreasing content of Ag.
- All heat treated samples exhibited better PL than as prepared samples.
- Time of the treatment (2 or 12 hours) did not cause a dramatic change.
- For heat treated samples, higher Ag concentrations; better PL implying Ag diffuse to more favorable positions.
- Colour point of all heat treated samples are same.
- No red emission in as prepared samples except 1 wt. % Ag.

CIA Diagram: Location of all samples revealing emitted color

CONCLUSION

- Heat treatment increases PL efficiency.
- Ag addition followed by heat treatment results in high PL efficiency.
- As prepared samples with higher silver addition exhibits poor PL.

FUTURE WORK

- HRTEM analyses will be used to provide a better explanation.
- Eu concentration will be examined for higher luminescence efficiency.