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# The effects of morphology of cerium oxide catalysts for dehydrogenation of ethylbenzene to styrene

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## Graphical abstract

### Highlights

1. CeO<sub>2</sub> cubes are more active than rods and particles for the dehydrogenation of Ethyl benzene to styrene.
2. In the presence of CO<sub>2</sub> there is a two-step pathway operating, dehydrogenation followed by reversed water gas shift (RWGS).
3. Removal of active O species by Ethylbenzene induced ceria lattice distortion as revealed by Raman.
4. The degree of ceria lattice distortion corresponds to the amount of O extracted.

## Abstract

Ethylbenzene (EB) dehydrogenation in presence and absence of CO<sub>2</sub> was investigated over CeO<sub>2</sub> catalysts of distinct morphologies: cubes, rods and particles. The presence of CO<sub>2</sub> resulted in prolonged catalyst activity and higher initial benzene

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