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Rare earths, rare-earth oxides, and the ocides' unique character: Application for environmental catalysts

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RARE EARTHS, RARE-EARTH OXIDES, AND THE OXIDE'S UNIQUE CHARANTER: APPLICATION FOR ENVIRONMENTAL CATALYSTS

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The rare earths series will be comprehensively introduced. The difference among lanthanide, lanthanoid, and rare earths will be also clearly defined. After these lectures, the unique characteristics of rare-earth oxides will be addressed. As one of promising applications of the rare earth oxides, the oxides' unique character of oxide anion migration in the solids will be also introduced and also for the application as the environmental catalysts.

Here, we focused on C-type cubic Gd_2O_3, and Y_2O_3 which has relatively strong basicity among rare earth elements, as a fundamental oxide to develop a novel catalyst. The rare earth (R) sites in R_2O_3 are partially replaced by another rare earth ion and barium to effectively inhibit catalyst poisoning and effectively enhancing NO direct decomposition. Especially, $(Y_{0.69}Tb_{0.30}Ba_{0.01})_2O_{2.99+\delta}$ solid solution was succeeded in designing as the novel promising direct NO decomposition catalyst, showing a perfect NO decomposition into N_2 and O_2.