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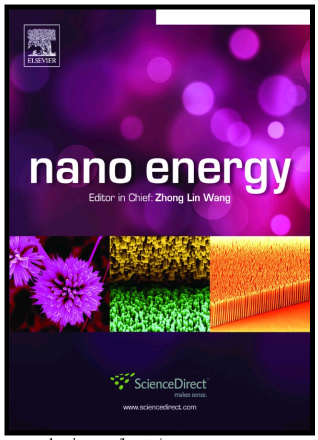

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Abstract

Efficient storage of solar and wind power is one of the most challenging tasks still limiting the utilization of the prime but intermittent renewable energy sources. The direct storage of concentrated solar power in renewable fuels via thermochemical splitting of water and carbon dioxide on a redox material is a scalable approach with up to 54% solar-to-fuel conversion efficiency. Despite progress, the search for earth-abundant materials that can provide and maintain high H_2 and CO production rates over long period of high-temperature cycles continues. Here, we report a strategy to unlock the use of manganese, the 12th most abundant element in the Earth's crust, for thermochemical synthesis of solar fuels, achieving superior thermochemical stability, oxygen exchange capacity, and up to seven times higher mass-specific H_2 and CO yield than cerium dioxide. We observe that incorporation of a small fraction of cerium ions in the manganese (II,III) oxide crystal lattice drastically increases its oxygen ion mobility, allowing its

Figure 3