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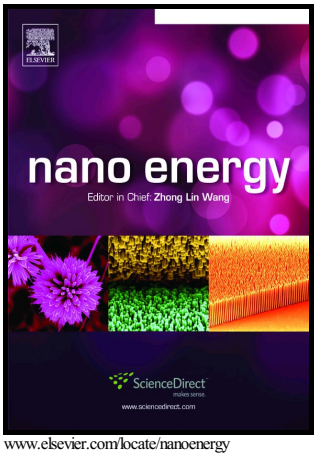

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Abstract: Polystyrene (PS) is introduced to stabilize the perovskite component, grains and microstructures by forming PS-capped perovskite grains. It is found that the PS coverage has significant advantages in suppressing the component loss and phase separation, obstructing moisture corrosion and promoting crystal self-healing of perovskite films. Besides, with the PS involvement, exceeding 20% efficiency of a planar TiO_2 based cell has been achieved by decreasing charge traps and nonradiative recombination.