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Van der Waals materials for the passivation of monolayer closed-packed films of CdSe quantum dots DENNIS ZI-REN WANG, DATONG ZHANG, RICHARD CRESWELL, Columbia University, CHENGUANG LU, National Center for Nanoscience and Technology, JIAYANG HU, IRVING P. HERMAN, Columbia University — Van der Waals (vdW) materials are shown to protect CdSe quantum dots (QDs) from oxidization. Few-layer vdW materials, e.g. graphene and MoS2, were transferred onto a monolayer closed-packed CdSe quantum dots and were examined by photoluminescence (PL) after different time periods. By comparing the PL of CdSe QDs in uncovered areas and those covered by different numbers of layers of graphene and MoS2, we saw that vdW encapsulation slows down the aging of CdSe QDs dramatically. PL mapping results clearly showed better protection of the CdSe QDs under the central part of the vdW material compared to that at the edge; this can be explained by the diffusion of oxygen and water vapor from the edge of the vdW materials.

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