Coherent optical association of single molecules

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We report coherent association of a single NaCs molecule in an optical tweezer through an optical Raman transition. By selecting a deeply bound intermediate state, we suppress the scattering loss during the transfer process. Starting from atoms in their relative motional ground state, we achieve optical transfer efficiency of 50% . The molecule we create have a zero-field binding energy of 770MHz and lifetime up to 1ms . We demonstrate that coherent creation of ground state single molecule is possible, even without Feshbach resonance or narrow optical transition.

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