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Supplementary information

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All optical logic devices based on black arsenic–phosphorus with strong nonlinear optical response and high stability

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Section 1: The nonlinear optical response of B-AsP at different concentrations

Figure S1 shows the nonlinear optical response of B-AsP at different concentrations, which demonstrates that after the concentration of the B-AsP material is doubled, the corresponding nonlinear response is also nearly doubled accordingly.

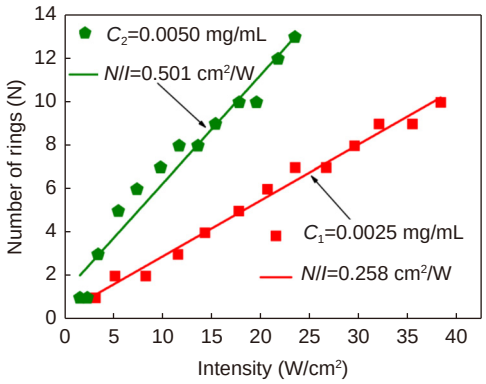

Fig. S1 | The nonlinear optical response of B-AsP when the concentrations are C_1= 0.0025 mg/mL and C_2 = 0.0050 mg/mL at λ = 532 nm.

Section 2: Nonlinear optical response of BP and B-$As_{0.4}P_{0.6}$

The nonlinear optical response of BP and B-$As_{0.4}P_{0.6}$ are shown in Fig. S1. For a comparison, the B-$As_{0.4}P_{0.6}$ is measured to have a stronger nonlinear optical response than BP under λ = 532 nm and 671 nm, indicating that the B-$As_{0.4}P_{0.6}$ is more suitable for the design of nonlinear photonic devices.

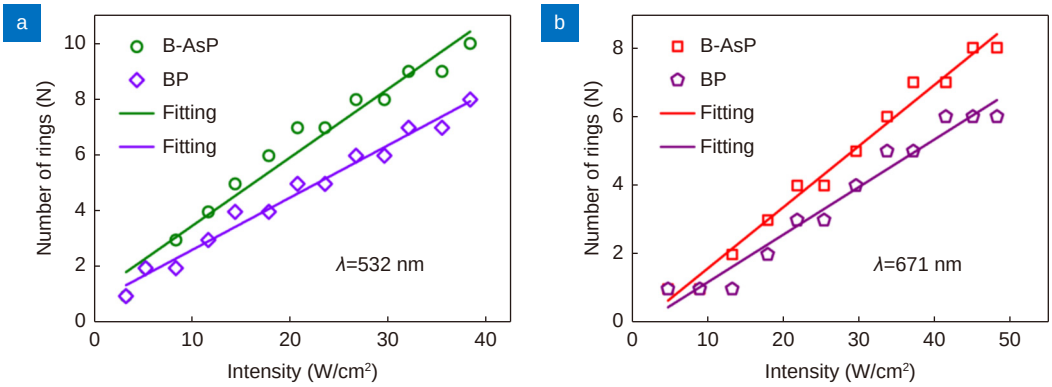

Fig. S2 | The nonlinear optical response of BP and B-$As_{0.4}P_{0.6}$ under λ = 532 nm and 671 nm.

Section 3: Unidirectional nonlinear excitation at λ = 532 nm

The phenomenon of unidirectional nonlinear excitation can be achieved not only at λ = 671 nm, but also at λ = 532 nm (Fig. S2), indicating that the hybrid structure has a broadband optical response to realize the spatial asymmetric light propagation.

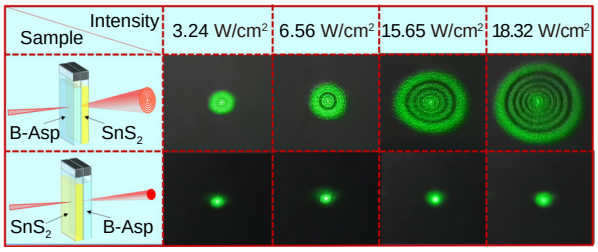

Fig. S3 | The unidirectional nonlinear excitation in 2D B-AsP/ SnS_2 hybrid structure at λ = 532 nm.