We report a compact, efficient, high-energy and high-repetition-rate mid-infrared picosecond OPO based on a new nonlinear material CdSiP2. The OPO is synchronously pumped by a master-oscillator power-amplifier system at 1064.1 nm, providing 1-µs-long macro-pulses constituting 8.6 ps micro-pulses at 450 MHz, and can be tuned over 486 nm across 6091-6577 nm, covering the technologically important wavelength range for surgical applications. Using a compact cavity (~30 cm) and a CdSiP2 crystal, idler macro-pulse energy as high as 1.5 mJ has been obtained at 6275 nm, for an input energy of 30 mJ. The extracted signal pulses have durations of 10.6 ps.