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Acceptors in zinc oxide: Nitrogen will not work

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Zinc oxide (ZnO) is a new/old semiconductor with potential applications in optoelectronics, spintronics, and transparent electronics. There is an ongoing quest for an acceptor dopant that can yield reliable *p*-type conductivity. Early work suggested that nitrogen acceptors could fulfill that role. However, our experimental results verify recent theoretical predictions that the N acceptor level is ~ 1.5 eV above the valence band, too deep for any practical application requiring free holes. All is not lost, though. Potential alternatives will be discussed.