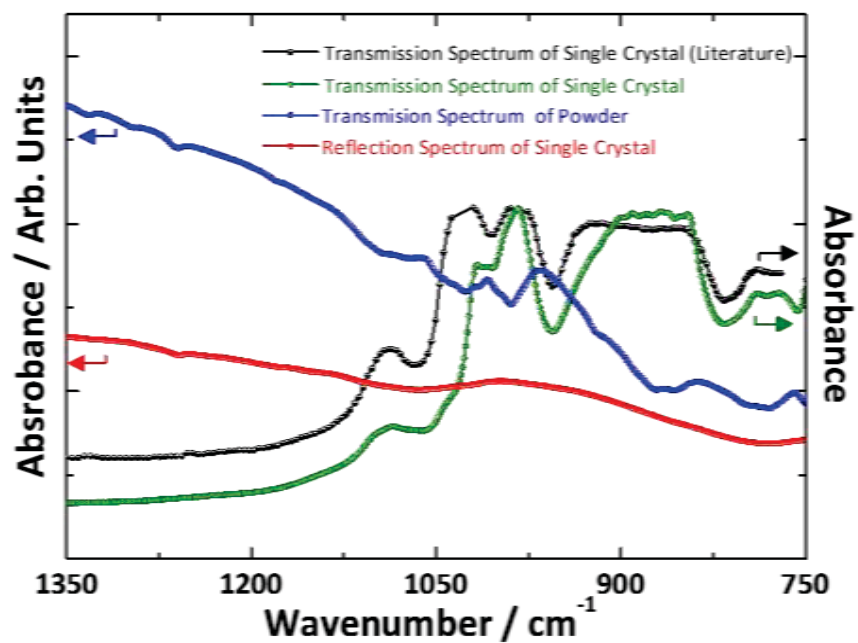
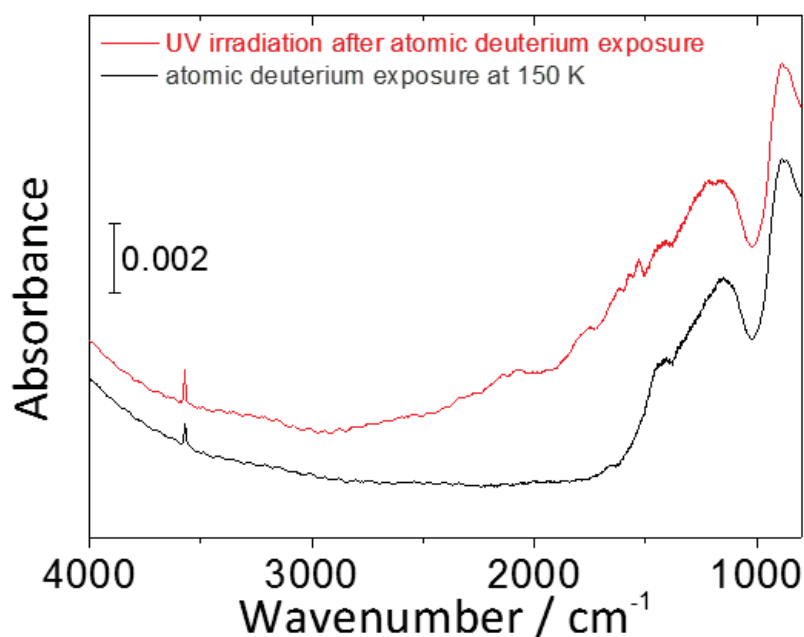


SUPPLEMENTARY FIGURE 1 Rapid scan IR spectra acquired before and during (a) and during and after (b) illuminating the ZnO(10-1) single crystal with UV light at 75 K. Under UV irradiation, hole-polarons are created, which show a characteristic feature in the spectra.



SUPPLEMENTARY FIGURE 2 The mid-IR absorbances of a ZnO single crystal from literature [6] (black) and a ZnO (10-10) single crystal (olive) measured in transmission. The raw IR profiles of ZnO powder (transmission; blue trace) and single crystal (10-10) (reflection; red trace).



SUPPLEMENTARY FIGURE 3 IR reflection absorption spectra recorded after exposing the ZnO(10-10) single crystal to atomic deuterium (10 L) at 150 K prior (black trace) to and during (red trace) UV-irradiation.

Supplementary Note 1 Reference experiments on powder samples

Reference experiments were carried out for ZnO powder particles (NanoTek, average particle size 60-70 nm), deposited on a transmission electron microscopy grid (spacing of 103 μm , total optical transmission 37%). For the powders, IR absorption spectra were recorded in transmission as reported previously [2].

Supplementary References

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