SUPPLEMENTARY INFORMATION

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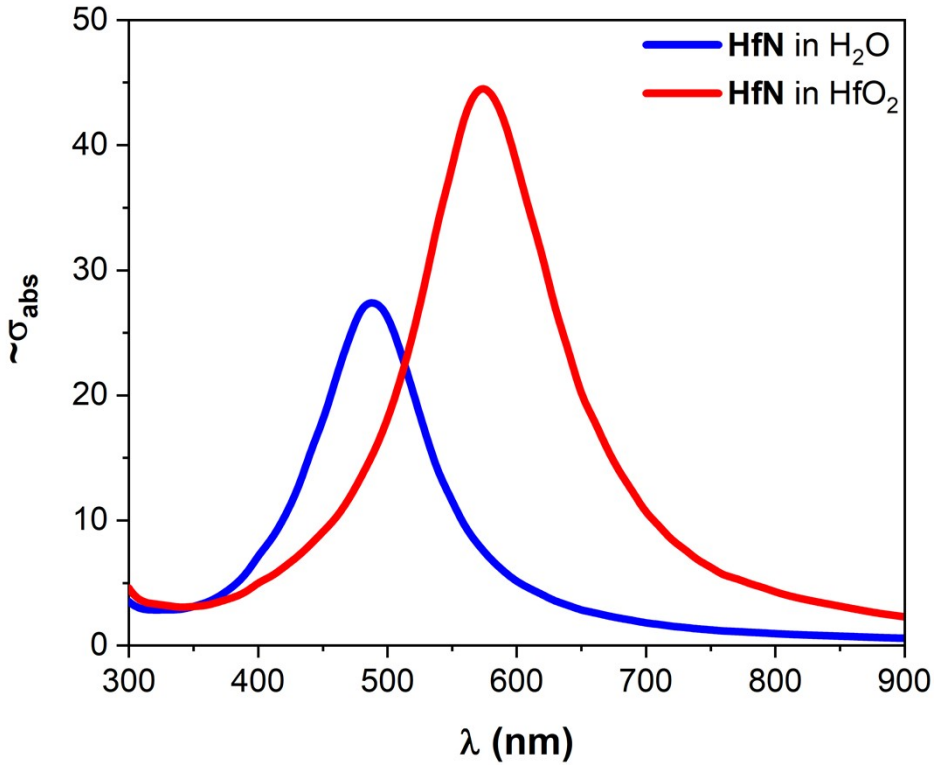

Fig. S1 Calculated Joule number values, proportional to absorption cross-section σ_{abs} for HfN NPs in water (blue line) and hafnium oxide (red line) surrounding medium.

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Laser-synthesized plasmonic HfN-based nanoparticles as a novel multifunctional agent for photothermal therapy

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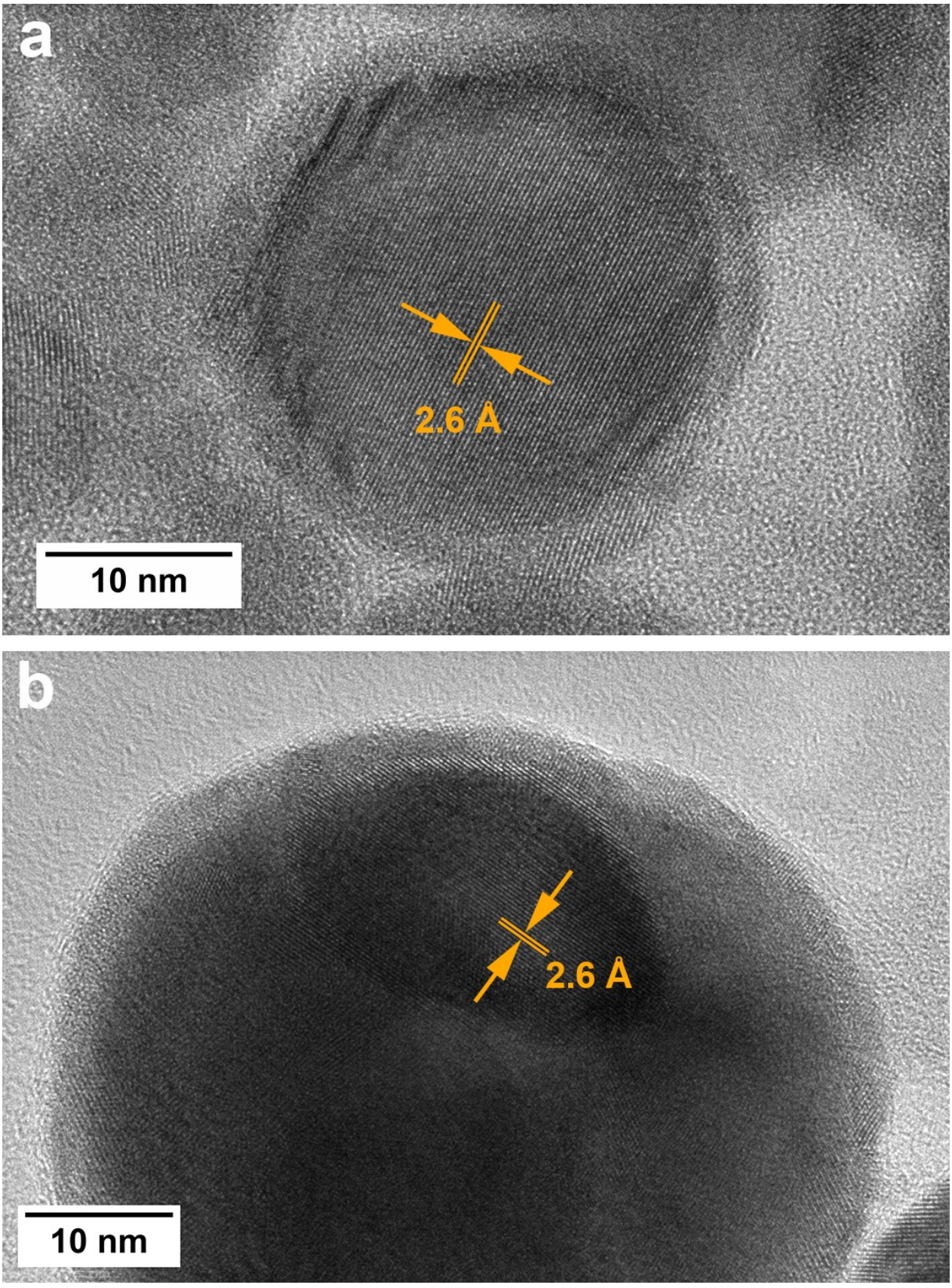

Fig. S2 HR-TEM images of HfN-based NPs prepared in (a) ethanol and (b) acetone. The interplanar spacing of the laser-synthesized NPs is about 0.26 nm, which corresponds to the table value for (111) plane of crystalline HfN.

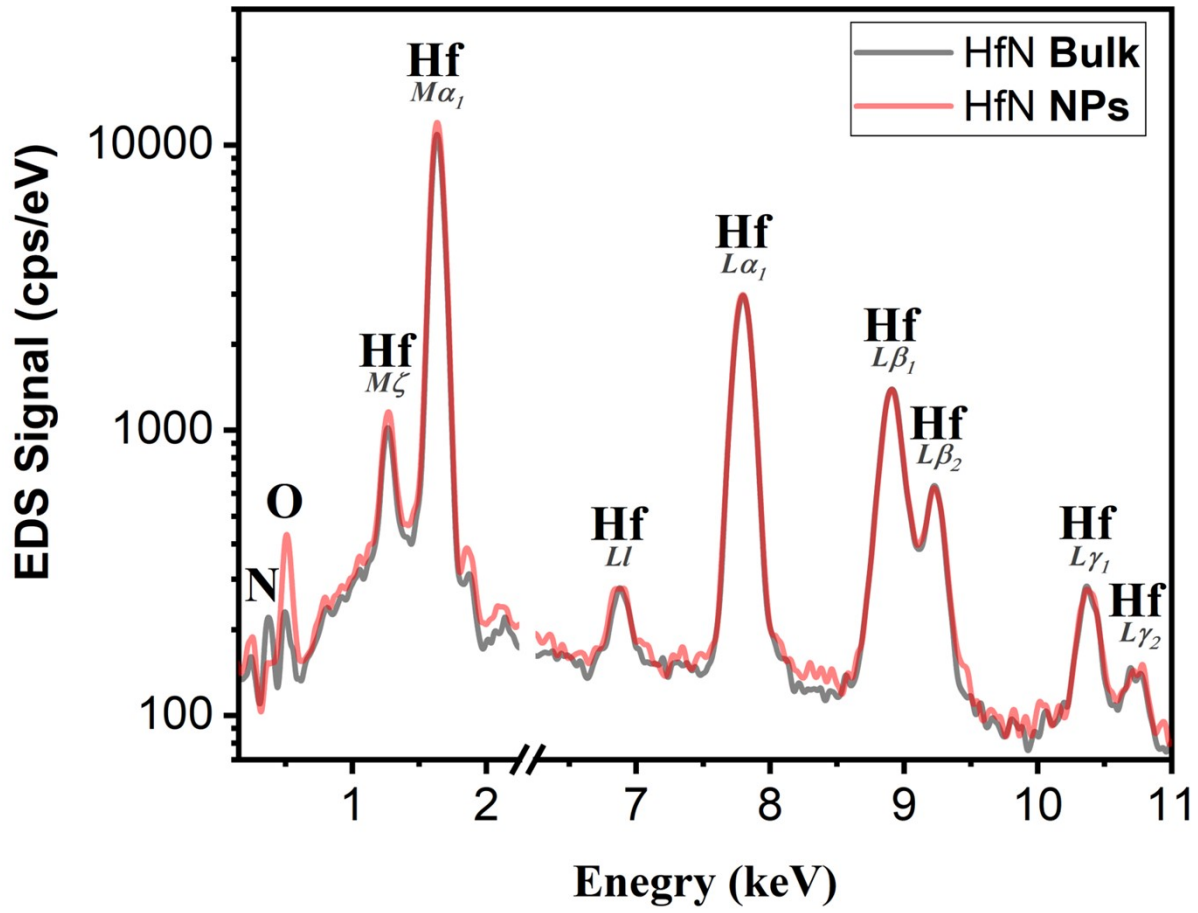

Fig. S3 EDX spectrum of HfN-based NPs prepared in acetonitrile.

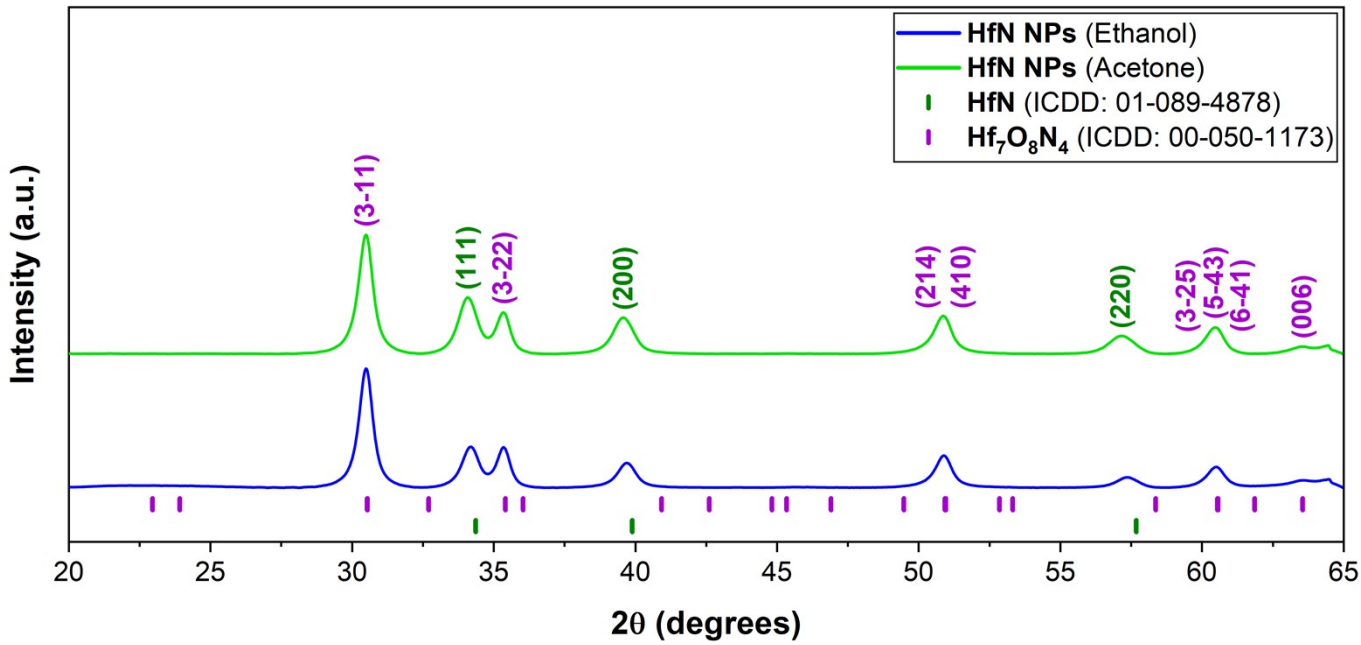

Fig. S4 XRD patterns of HfN-based NPs powders prepared in ethanol (blue line) and acetone (green line). Table positions of crystalline HfN and $Hf_7O_8N_4$ are given above the pattern.

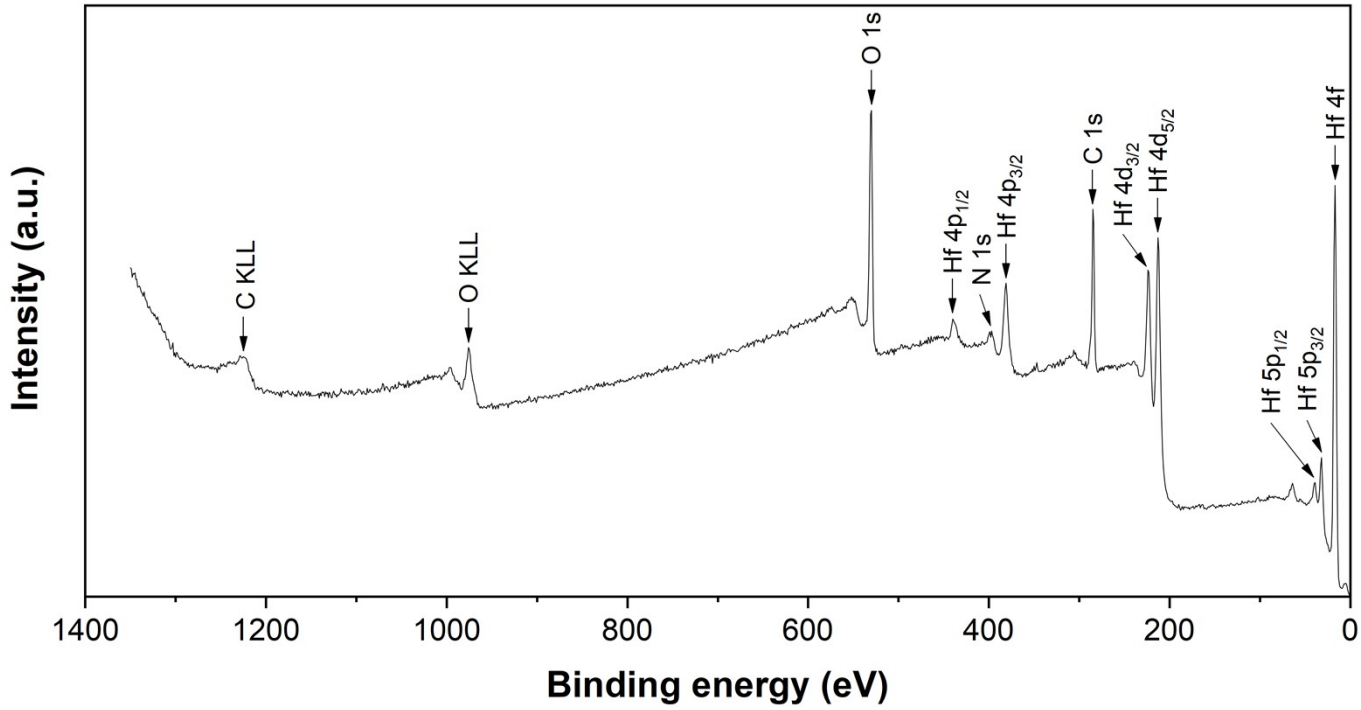

Fig. S5 XPS survey spectrum of HfN NPs prepared in acetonitrile.

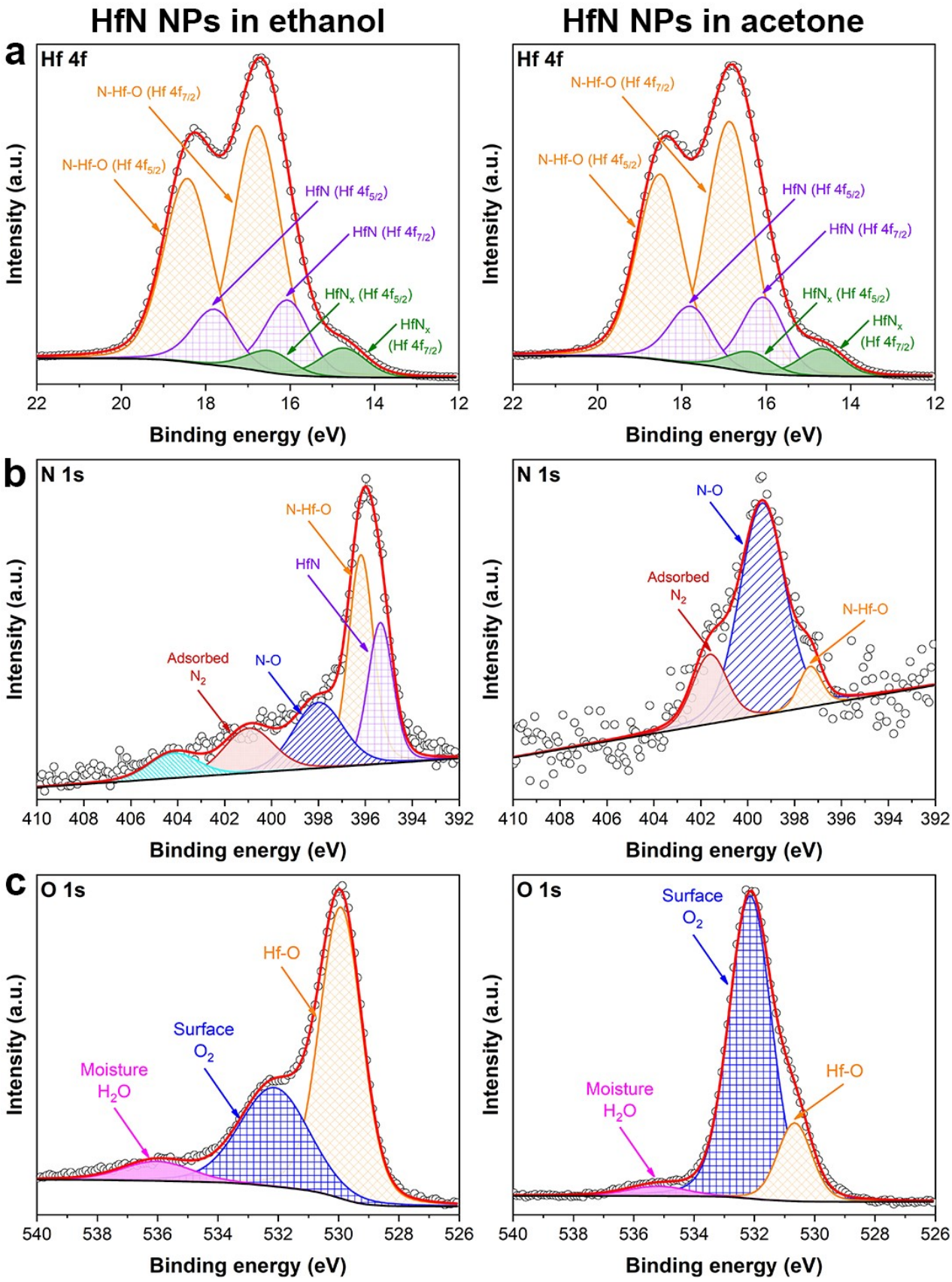

Fig. S6 X-ray Photoelectron Spectroscopy (XPS) characterization of laser-synthesized HfN-based NPs in ethanol (left) and acetone (right): Hf 4f (a), N 1s (b), O 1s (c). Shirley background correction is applied.

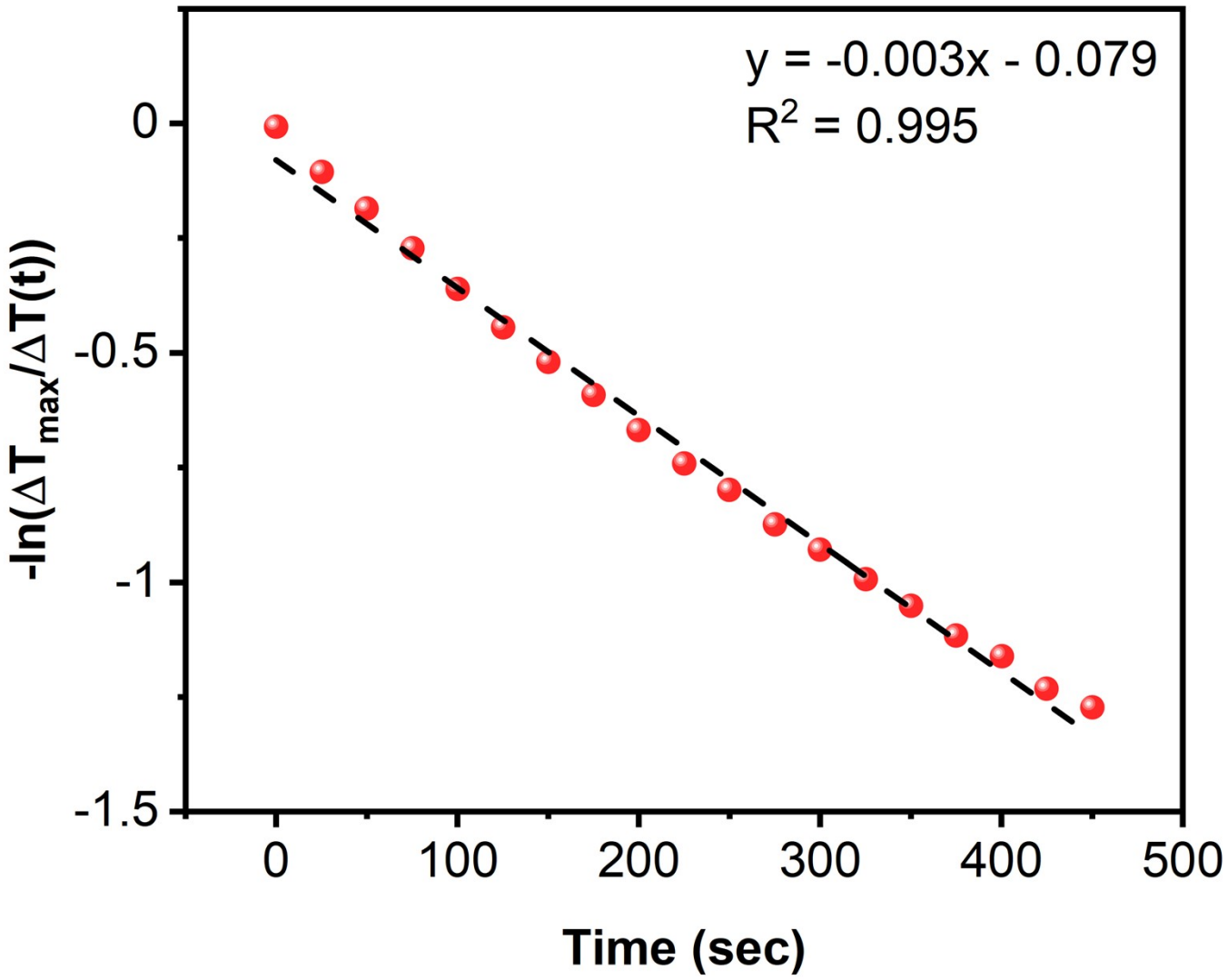

Fig. S7 Dependence of negative natural logarithm of temperature ratio on cooling time.

The Joule (Jo) number describes heat generation properties of nanoparticles composed of different materials and placed in various media.[1] The definition of Jo number reads as follows:

$$Jo = 9\frac{e\varepsilon''}{n_s}\left|\frac{\varepsilon_s}{\varepsilon+\varepsilon_s}\right|^2 = \frac{\lambda_{ref}\sigma_{abs}}{2\pi V},$$

where $e = \lambda_{ref}/\lambda$ with $\lambda_{ref} \approx 1240\ nm$, λ is the wavelength, ε'' is the imaginary part of the permittivity of nanoparticle material, n_s is the real part of the refractive index of the surrounding medium ($\varepsilon_s = n_s^2$); σ_{abs} is the absorption cross-section and V is the volume of the nanoparticle. Optical constants for calculations (Fig. S1) were taken from the following sources.[2-4]

References

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