

1 Reduction mechanism of Au metal ions into Au nanoparticles on

2 molybdenum disulfide

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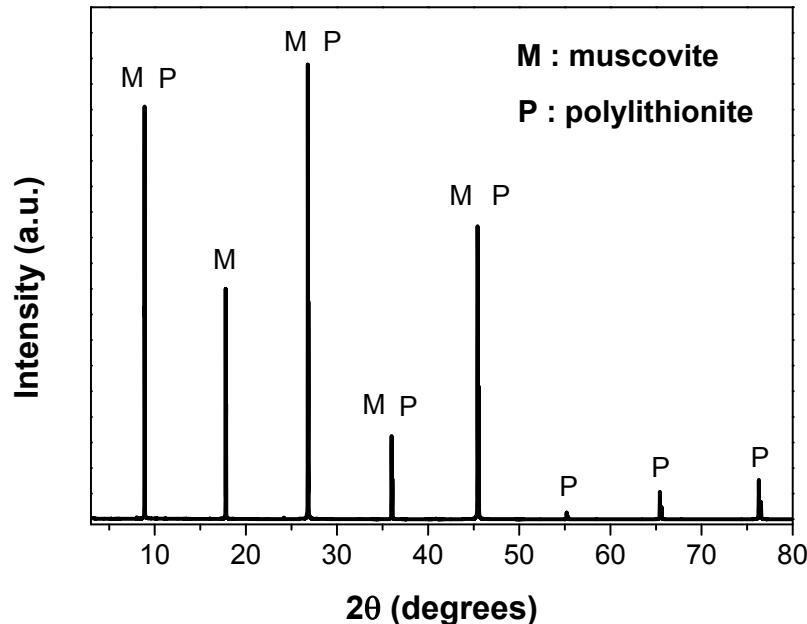
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19 Supporting Information includes 7 pages, 11 figures.

20 **Figures**

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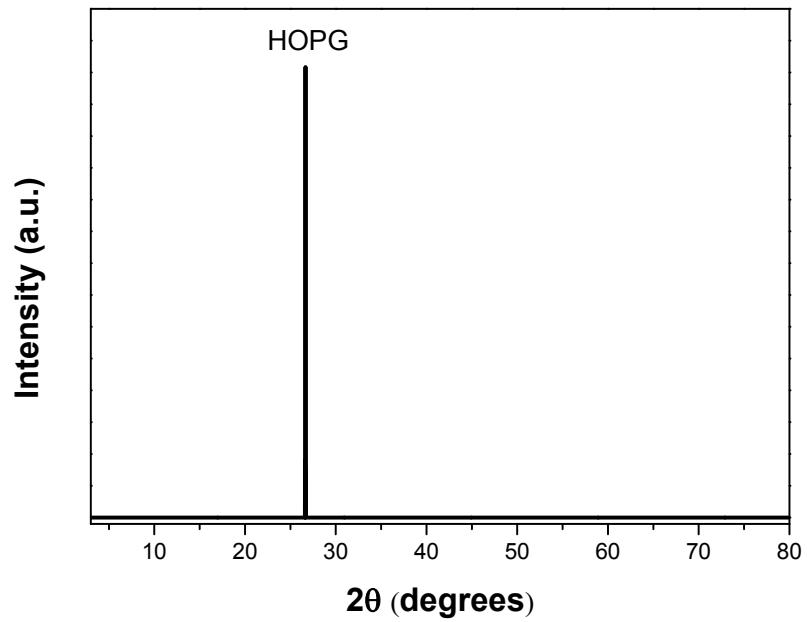
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Fig. S1. X-ray diffraction (XRD) pattern of natural mica.



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Fig. S2. X-ray diffraction (XRD) pattern of highly oriented pyrolytic graphite (HOPG).

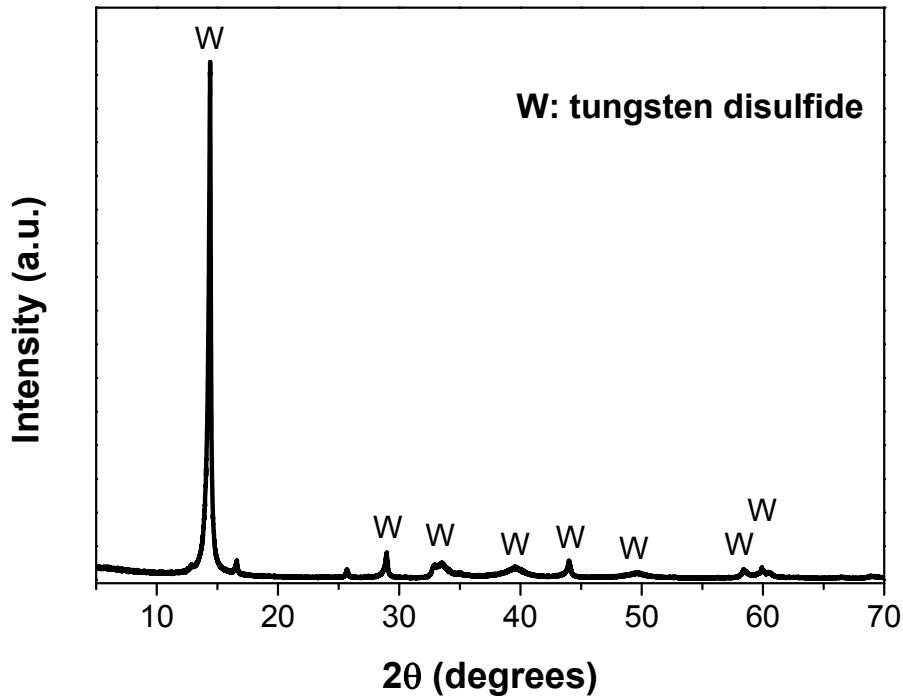


Fig. S3. X-ray diffraction (XRD) pattern of tungsten disulfide (WS_2).

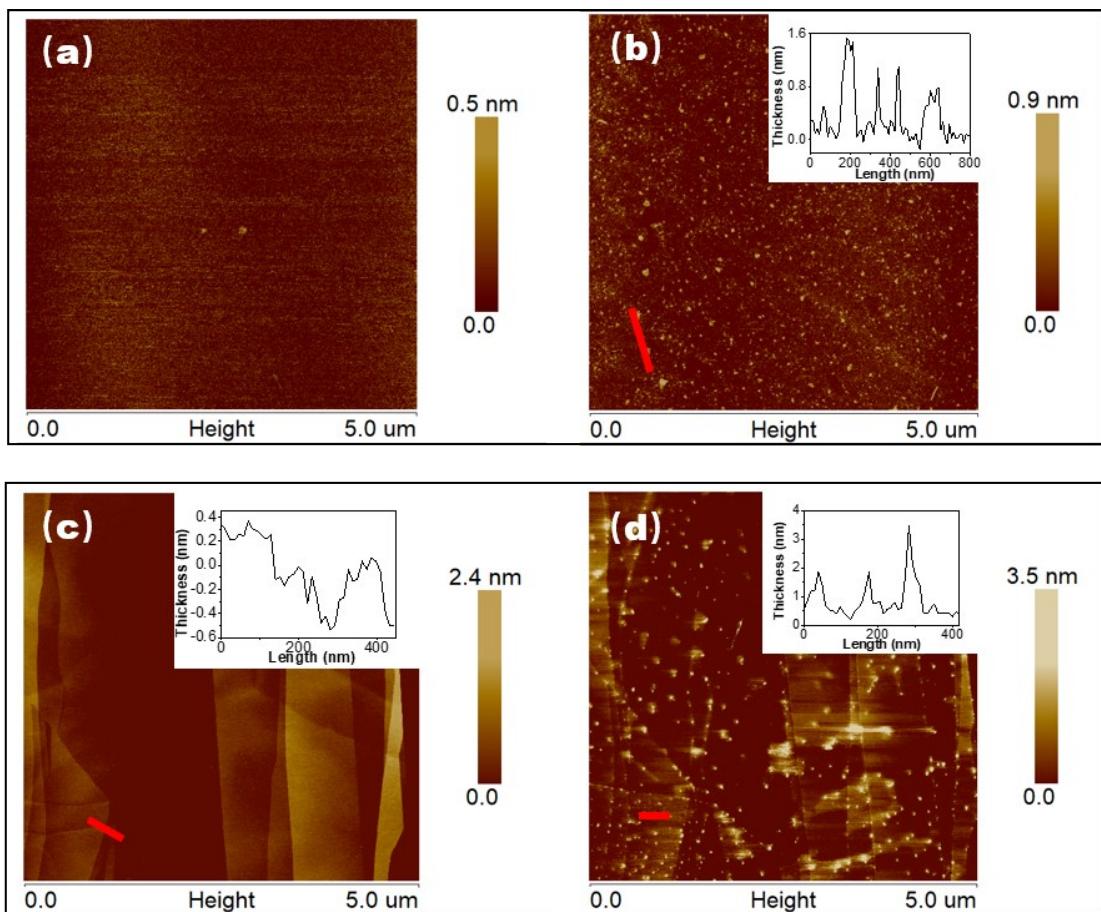
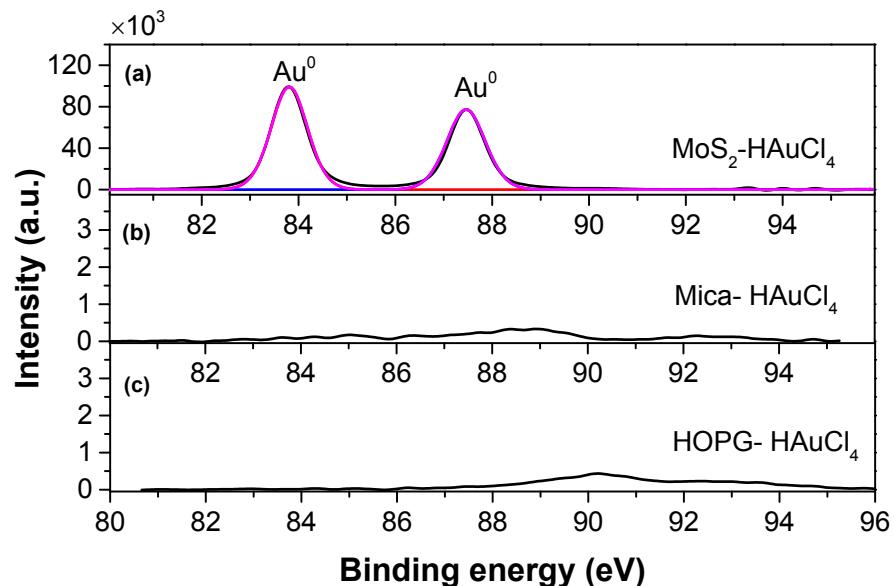
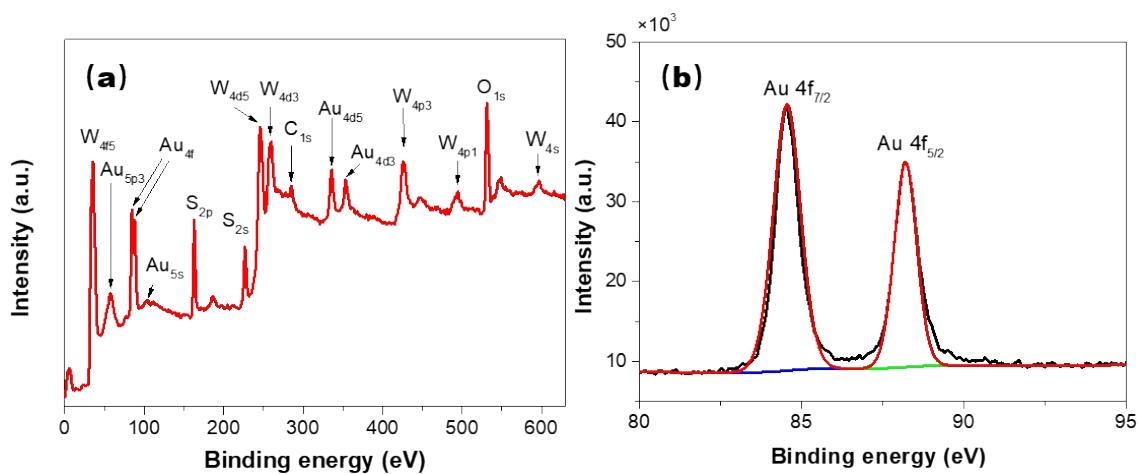


Fig. S4. AFM images of mica (a, b) and HOPG (c, d) surfaces before (left images) and after (right

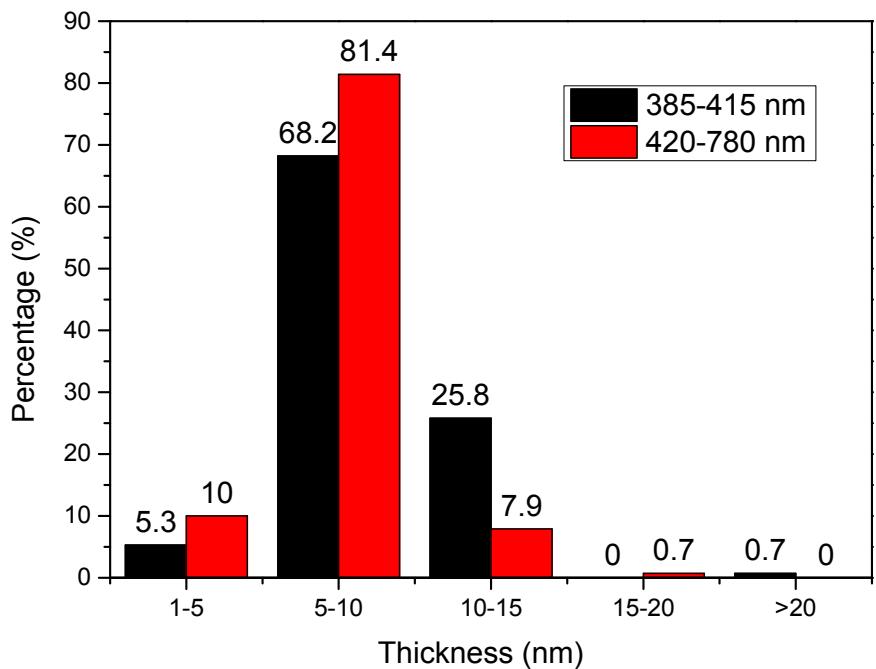
33 images) HAuCl₄ solution loading. The experiments were carried out under AFM laser irradiation
34 with wavelength of 670 nm.



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36 **Fig. S5.** X-ray photoelectron spectroscopy (XPS) spectra of molybdenum disulfide (a), mica (b),
37 and HOPG (c) after 15 min HAuCl₄ loading under light irradiation with wavelength of 390-780
38 nm.
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41 Fig. S6. XPS spectra of tungsten disulfide after reacting with HAuCl₄ for 24h under light
42 irradiation with wavelength of 390-780 nm and light intensity of 150W: wide-scan XPS spectra
43 (a), Au 4f spectra (b).
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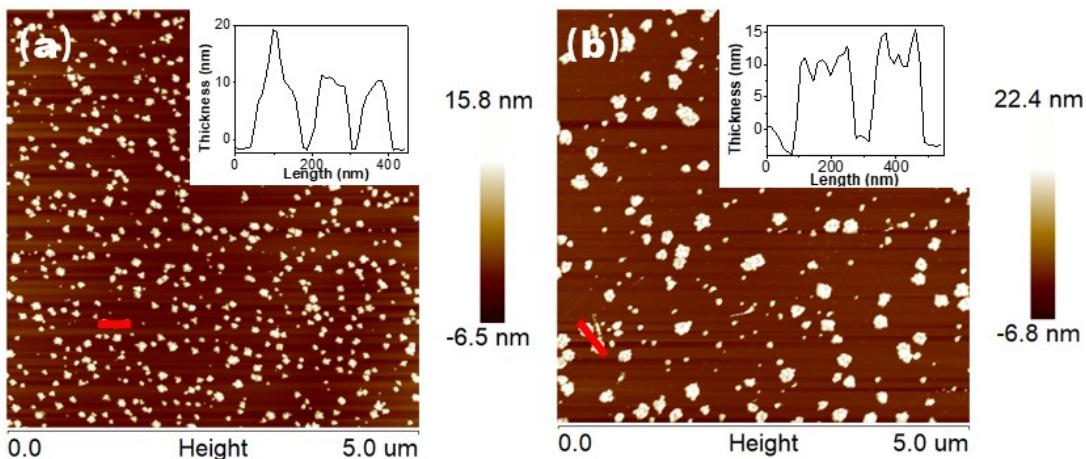


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47 **Fig. S7.** Height distribution of Au particles on molybdenum disulfide after being exposed in
 48 HAuCl₄ solution and being irradiated at 385-415 nm and 420-780 nm wavelength.

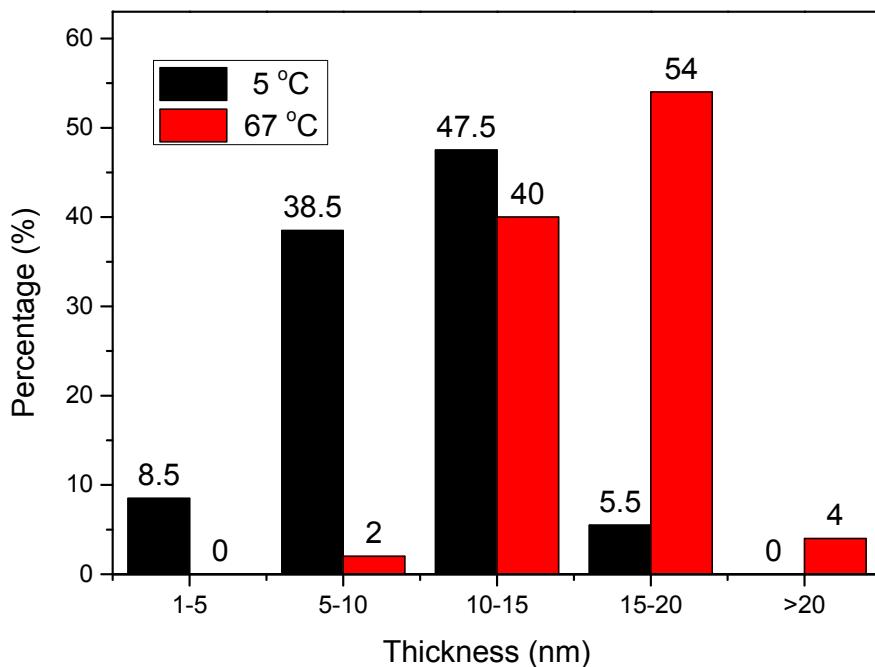
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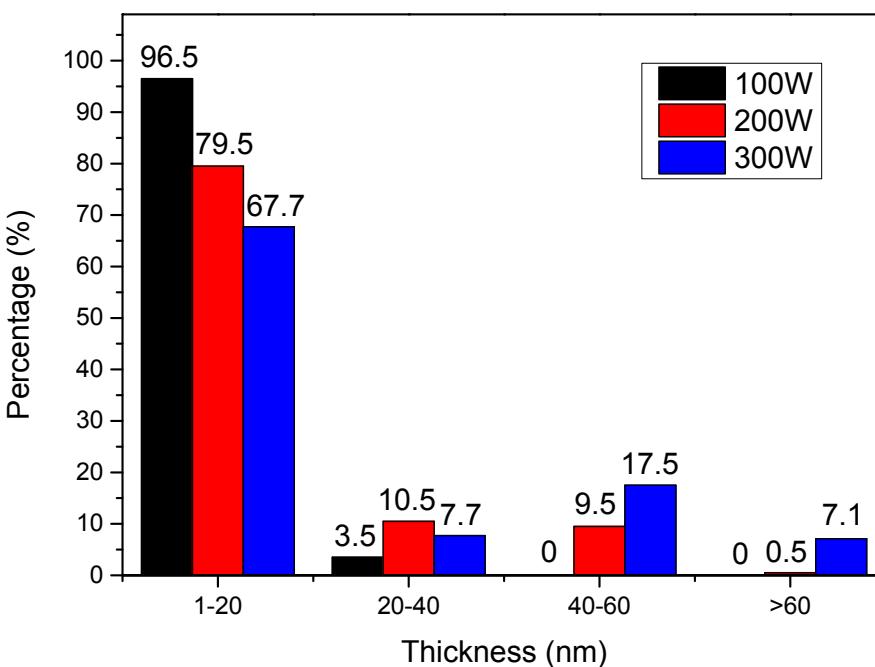


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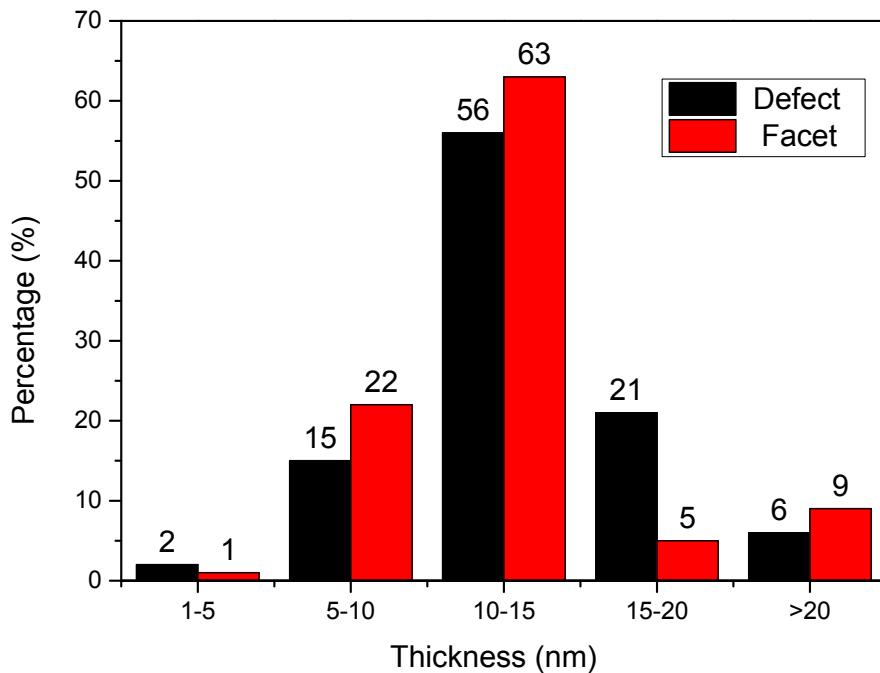
52 **Fig. S8.** AFM images of the MoS₂ after 15min HAuCl₄ at 5 °C (a) and 67 °C (b) under light
 53 irradiation with wavelength of 390-780 nm.



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55 **Fig. S9.** Height distribution of the Au particles on MoS₂ after 15min HAuCl₄ at 5°C and 67°C
56 under light irradiation with wavelength of 390-780 nm.
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60 **Fig. S10.** Height distribution of Au particles on molybdenum disulfide after being exposed in
61 HAuCl₄ solution under 420-780 nm irradiation with different light intensities: low light intensity
62 (100W), medium light intensity (200W), and high light intensity (300W).
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65 **Fig. S11.** Height distribution of Au particles along defects and in flat area of MoS₂ surface after
66 HAuCl₄ solution loading under 25°C.