Supporting Information

Self-doped ZnO Microrods - High Temperature Stable Oxygen Deficient Platforms for Solar Photocatalysis

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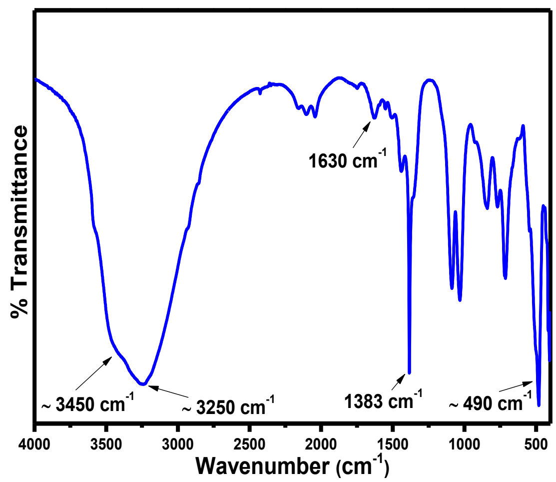

Figure S1. FTIR spectrum of the ZnO precursor

The IR spectrum of ZnO precursor has shown a very broad peak in the range 3000-3500 cm^{-1} as compared to the calcined samples which is due to the N-H stretching vibration ~3250 cm^{-1} present along with O-H stretching in the ZnO precursor. The N-H stretching arises due to the presence of ammonia weakly bound to ZnO. After calcination at high temperatures, the absorption peak of N-H vibration was disappeared and an absorption peak at ~3450 cm^{-1} is alone visible. For ZnO precursor, the Zn-O-Zn characteristic band is present at ~490 cm^{-1}.[1,2] The intense sharp peak at 1383 cm^{-1} could be assigned to the surface adsorbed CO_2 molecules.[3]

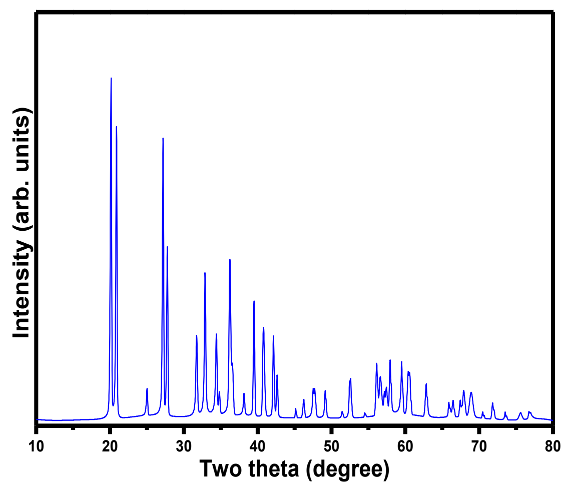

Figure S2. XRD pattern of the ZnO precursor

XRD pattern of ZnO precursor consists mainly of peaks that can be assigned to zinc (II) nitrate and $Zn(OH)_2$ along with a small percentage of ZnO.[1]

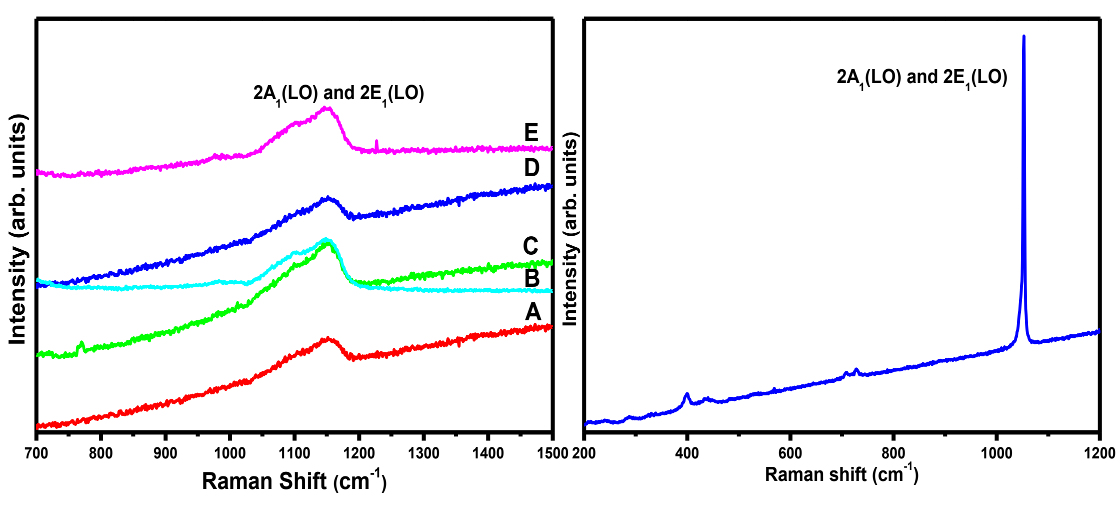

Figure S3. Raman spectra of A) ZnO-300, B) ZnO-500, C) ZnO-700, D) ZnO-800 and E) ZnO-900 (range: 700 cm^{-1} to 1500 cm^{-1}). Raman spectrum of the ZnO precursor (right)

The broad, intense peak at 1150 cm^{-1} could be assigned to contributions of $2A_1$ (LO) and $2E_1$ (LO) modes at the Γ point of the Brillouin zone and it is highly intense and sharp in the case of the ZnO precursor.[4]

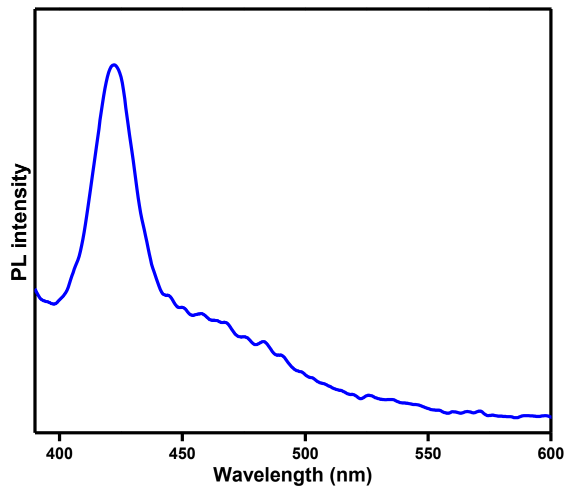

Figure S4. PL spectrum of the ZnO precursor

The ZnO precursor shows only a single lattice defect peak at 422 nm.[5]

Figure S5. Photographs of A) ZnO precursor B) ZnO-300 C) ZnO-500 D) ZnO-700 E) ZnO-800 F) ZnO-900

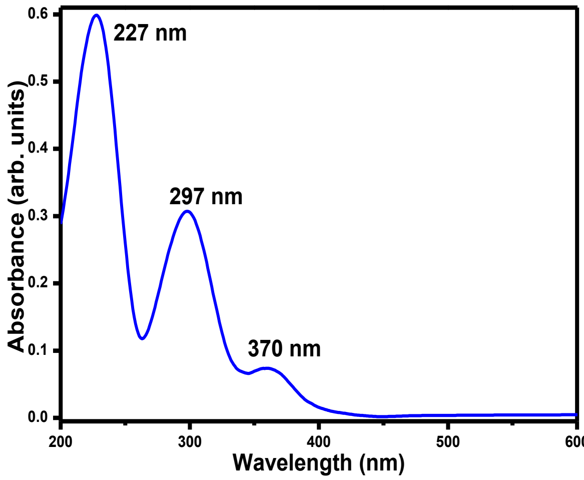

Figure S6. UV-Visible absorption spectra of the ZnO precursor

The ZnO precursor shows weak absorptions at 227, 297 and 370 nm confirms the poor UV absorption and weaker crystallization.[6]

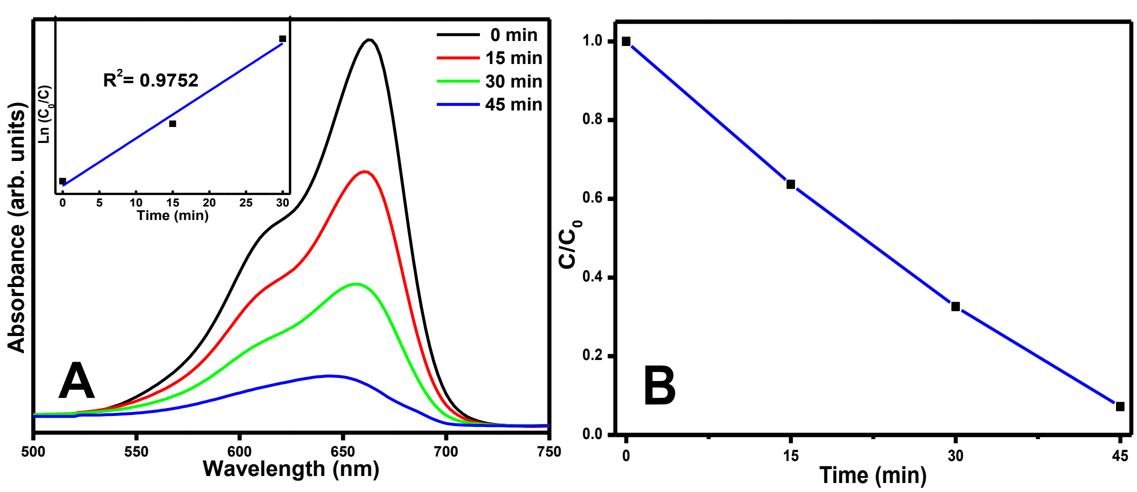

Figure S7. Sunlight driven photocatalysis of the ZnO precursor A) UV-Visible spectra, first order kinetic plot shown inset B) Degradation plot.

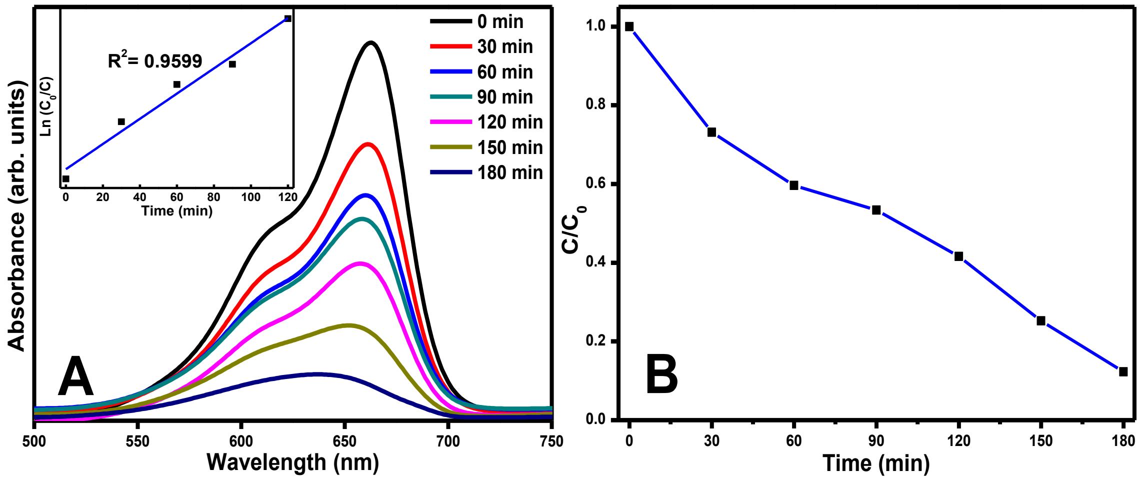

Figure S8. Photocatalysis under UV illumination of the ZnO precursor A) UV-Visible spectra, first order kinetic plot shown inset B) Degradation plot.

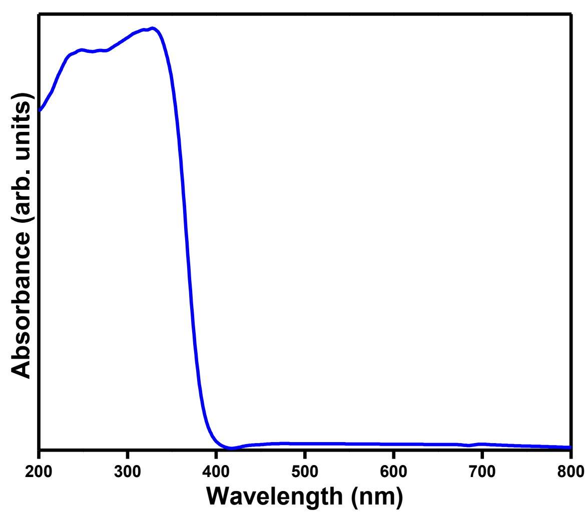

Figure S9. UV-Visible spectrum of Degussa-P25

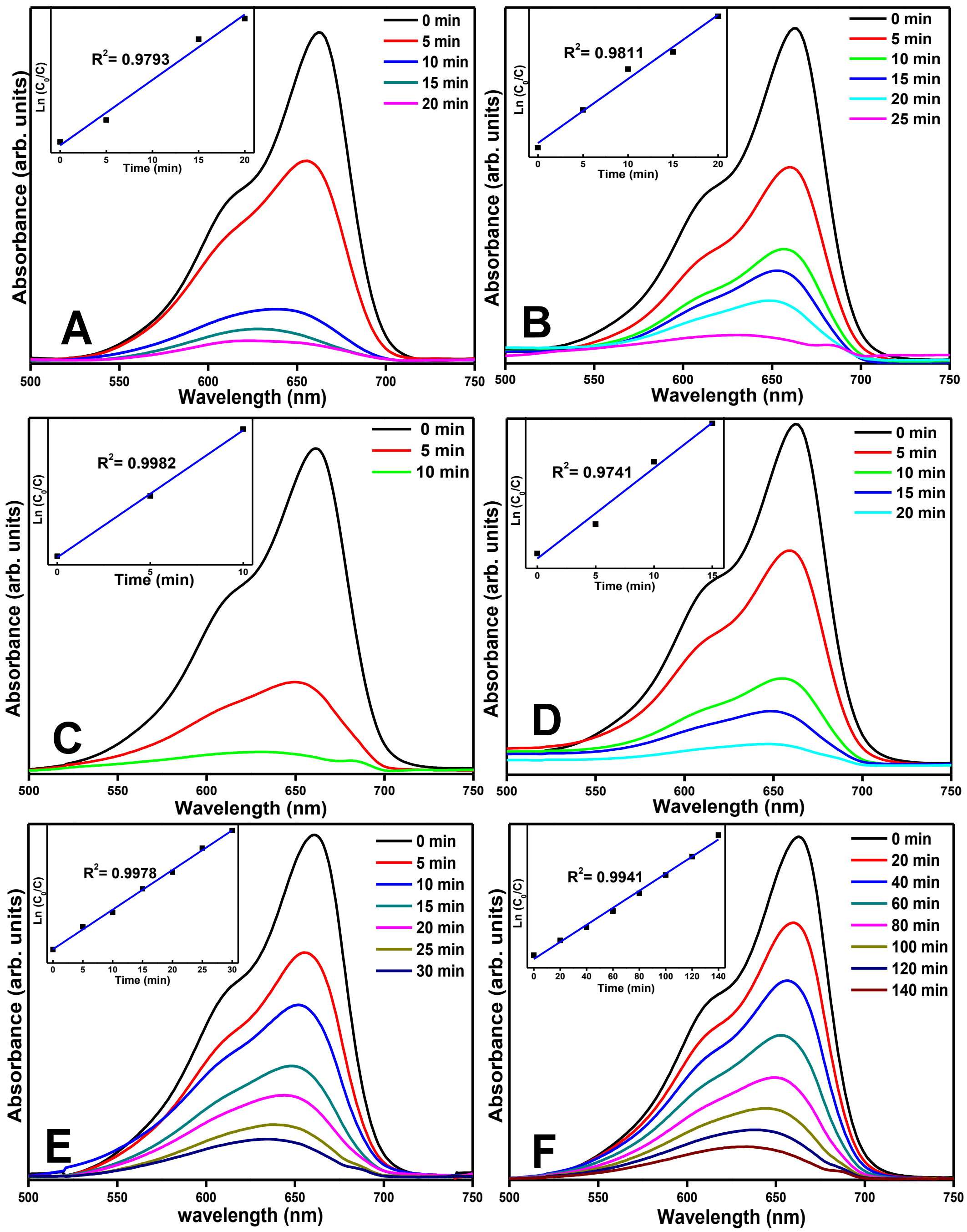

Figure S10: UV-Vis spectra of degradation of methylene blue by A) Degussa-P25 B) ZnO-300 C) ZnO-500 D) ZnO-700 E) ZnO-800 and F) ZnO-900 in presence of natural sunlight. The inset presents kinetic plots of the corresponding catalysis

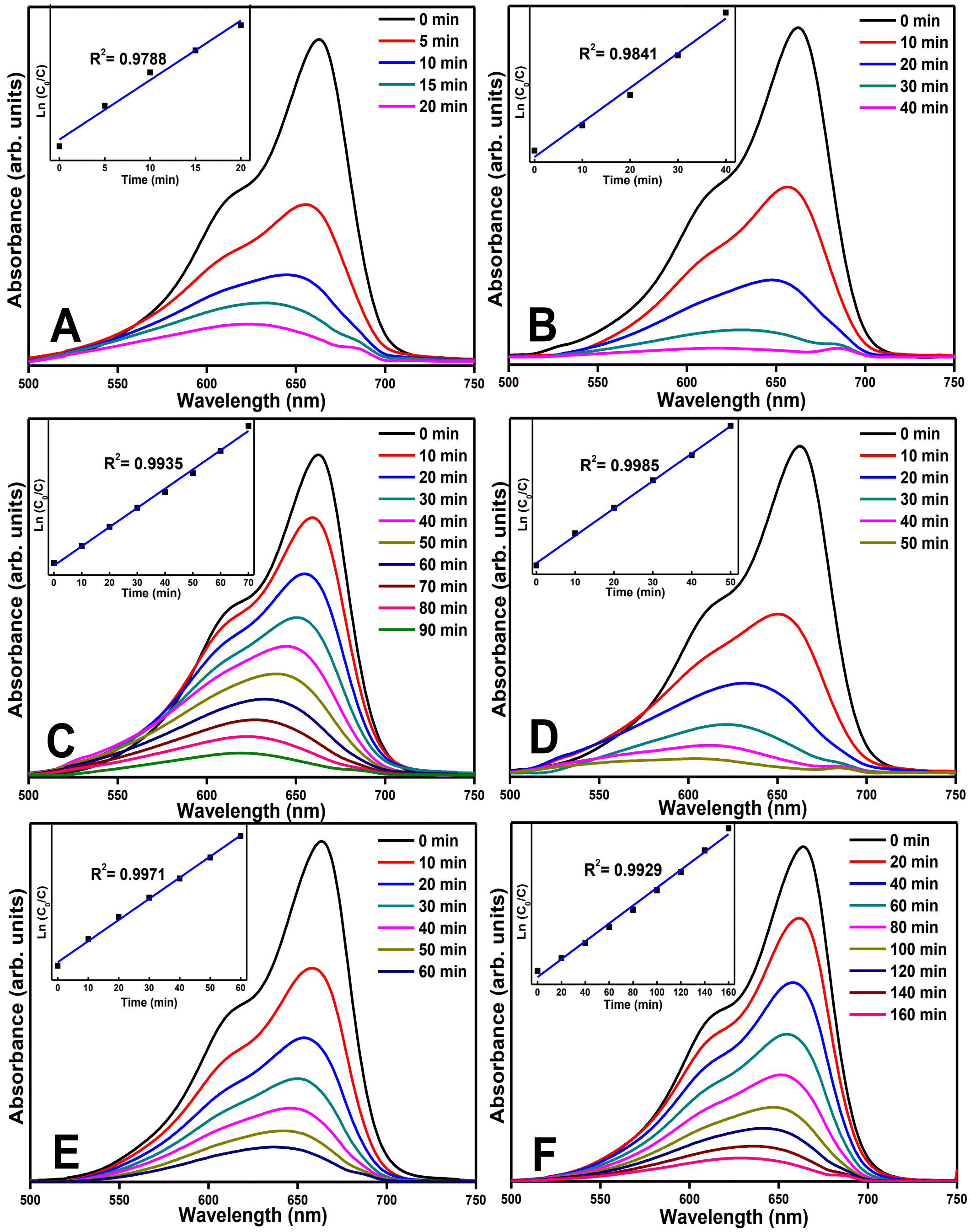

Figure S11: UV-Vis spectra of degradation of methylene blue by A) Degussa-P25 B) ZnO-300 C) ZnO-500 D) ZnO-700 E) ZnO-800 and F) ZnO-900 under UV illumination. The inset presents kinetic plots of the corresponding catalysis

References

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