

## Description of Additional Supplementary Files

**Supplementary Data 1** - The atomic coordinates of the optimized structure for Fe<sub>1</sub>-N<sub>4</sub>-O<sub>2</sub>.

**Supplementary Data 2** - The atomic coordinates of the optimized structure for Fe<sub>2</sub>-N<sub>6</sub>-O<sub>2</sub>-ver.

**Supplementary Data 3** - The atomic coordinates of the optimized structure for Fe<sub>2</sub>-N<sub>6</sub>-O<sub>2</sub>-par.

**Supplementary Movie 1** - Mini fan powered by two Fe<sub>2</sub>-N<sub>6</sub>-based Zn-air batteries

**Supplementary Movie 2** - LED powered by two Fe<sub>2</sub>-N<sub>6</sub>-based Zn-air batteries.