Electronic Supplementary Material (ESI) for RSC Advances.

2D graphene/FeOCl heterojunctions with enhanced tribology performance as a lubricant additive for liquid paraffin

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S1. Experimental details

The arithmetic mean diameters of each ball (d_1, d_2, d_3) in the experiment were calculated from Equation 1. The lower three fixed balls were not disturbed during the measurement, and the wear diameter of each ball was collected through the image acquisition system after each friction test.

S1.1. Tribological Parameters

S1.1.1 Contact stress of steel ball

Under the action of external force P, a circular contact area of radius D_h is formed due to local elastic deformation of the surface.

$$D_h = \sqrt[3]{6 \times P \times \frac{\frac{1-\mu_1^2}{E_1} + \frac{1-\mu_2^2}{E_2}}{\frac{1}{R_1} + \frac{1}{R_2}}} \tag{1}$$

Where, P=0.40825N, the actual load (Newtons) on the three horizontal spheres, which is 0.40825 times the applied load (N).

μ=0.3, poisson's ratio of the material

E=2.085×10^5 MPa, the modulus of elasticity of the material

R=6.35 mm, the radius of the steel ball

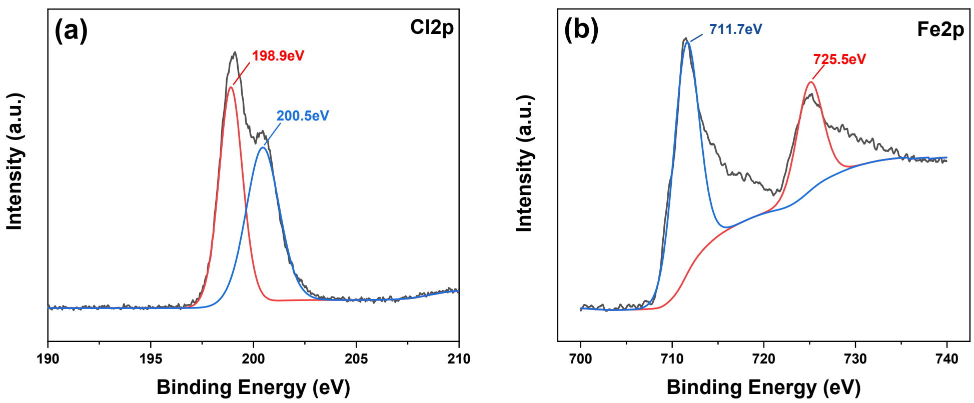
The maximum Hertz contact stress (τ_{max}) of the friction pair is calculated by the following form:

$$\tau_{max} = \frac{N}{S} \tag{2}$$

Where, $S = 0.25\pi D_h^2$

S1.1.1. Mean wear scar diameter (MWSD)

$$d = \frac{d_1 + d_2 + d_3}{3} \tag{3}$$



(c)

(d)

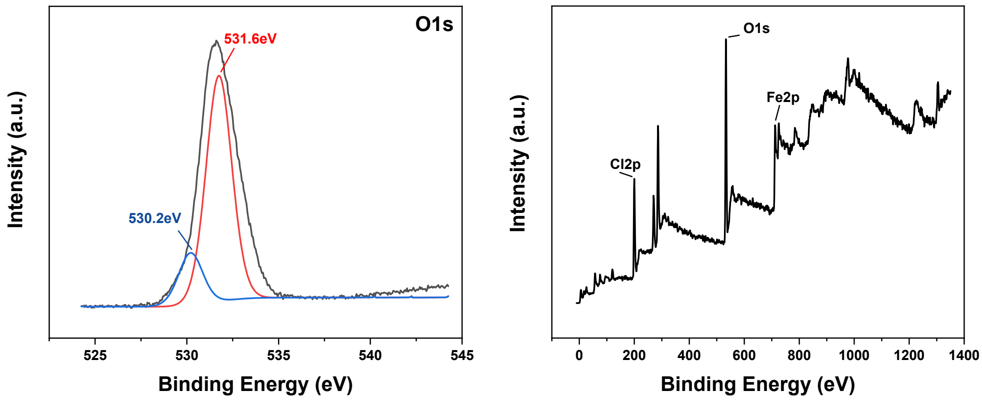


Figure.S1 XPS images of FeOCl heterozygote: (a) Cl 2p core-level spectra, (b) Fe 2p core-level spectra, (c) O 1s core-level spectra, and (d) XPS survey spectra.

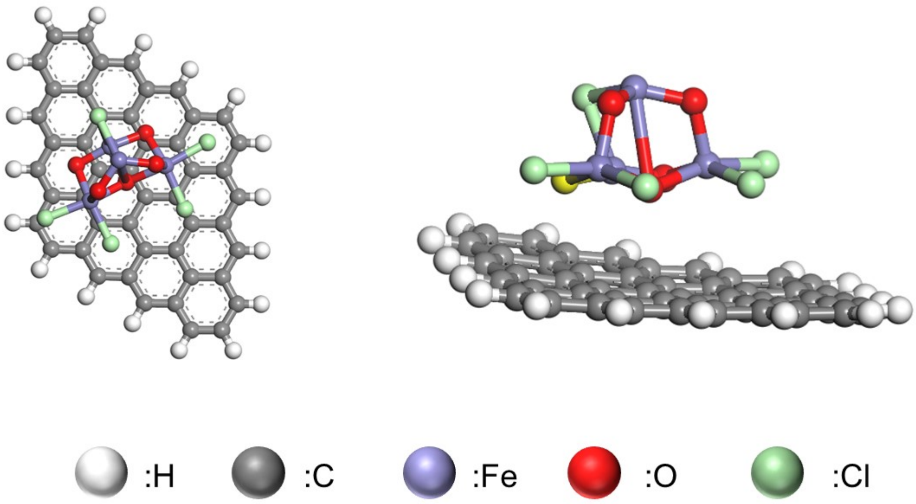


Figure.S2 Adsorption model of FeOCl and G: (a) top view ; (b) front view