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A functionalized hybrid silicate adsorbent derived from naturally abundant low-grade palygorskite clay for highly efficient removal of hazardous antibiotics

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1 **A functionalized hybrid silicate adsorbent derived from naturally abundant**
2 **low-grade palygorskite clay for highly efficient removal of hazardous antibiotics**

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9
10 **Abstract**

11 As promising eco-friendly materials, natural silicates have received great attention as
12 abundant, low-cost, non-toxic, stable, and environmentally benign adsorbents. Inspired
13 by the idea of “from nature, for nature”, a series of highly efficient hybrid silicate
14 adsorbents were synthesized *via* a simple one-step hydrothermal process, using
15 naturally abundant low-grade palygorskite (PAL) as the initial material in the presence
16 of sodium silicate (SS), magnesium sulfate (MS), and monochloroacetic acid (MCA).
17 As expected, the PAL crystal and the associated minerals were restructured as
18 amorphous and multi-porous Mg, Al-silicates, while the active –COOH groups were
19 simultaneously introduced into the silicate to form a hybrid adsorbent with a specific
20 surface area of 410.61 m²/g (compared to 52.87 m²/g for raw PAL). The hybrid silicate
21 adsorbent showed excellent adsorption capabilities for the antibiotics chlortetracycline

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