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## **New aspects of U(V) chemistry in oxo-materials: from ambient to extreme conditions**

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Using extreme pressure (10GPa/1200°C) we obtained a new modification of U<sub>2</sub>O<sub>5</sub> with an extraordinary dense structure. The crystal structure of resulting HP (high pressure)-U<sub>2</sub>O<sub>5</sub> is dramatically differs from ambient pressure polymorph so called delta-U<sub>2</sub>O<sub>5</sub>. The structure of HP-U<sub>2</sub>O<sub>5</sub> is more related to the cubic UO<sub>2</sub> than to the layered delta-U<sub>2</sub>O<sub>5</sub>. Using state of the art ab initio methods we reveal the stability ranges of both ambient and high pressure forms of U<sub>2</sub>O<sub>5</sub> and demonstrated a potential pathway of phase transition under pressure. In second case we demonstrated that the pentavalent uranium (U(V)) can be stabilized in [Ln(UVO<sub>2</sub>)W<sub>4</sub>O<sub>14</sub>] (Ln = Nd-Tm and Y) series via aliovalent substitution of Ca<sup>2+</sup> cations. We confirmed U(V) stabilization using state of the art methods such as U M4 edge high energy resolution X-ray absorption near edge structure (HR-XANES).Magnetic study reveals low temperature ordering of 5f<sub>1</sub> and 4f<sub>n</sub> systems. All the phases tend to demonstrate the antiferromagnetic properties with significant difference between pure 5f<sub>1</sub> system (Y-beating phase) and 5f<sub>1</sub>-4f<sub>n</sub> compounds (Nd-Tm).

### **Summary**

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