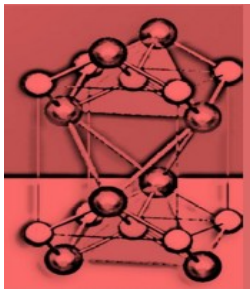

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Environmental stability of $Cr_2Ge_2Te_6$

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Some layered magnetic materials like $Cr_2Ge_2Te_6$ sustain magnetic long range order even in the atomically thin limit and have sparked intense research efforts to implement them in nano-spintronic devices. On the other hand, there are serious practical obstacles to such plans due to their poor environmental stability. In order to actively prevent rapid degradation, a microscopic understanding of the involved reactions and energy scales is needed. Here we perform an in-depth investigation of the $Cr_2Ge_2Te_6$ surface by x-ray photoemission spectroscopy in combination with density functional theory. We find that the surface degradation is driven by germanium oxidation. Tellurium oxidation proceeds in two steps involving an intermediate state of partial oxidation. Oxidation starts rapidly at the fresh surface but slows down afterwards continously. Our results single out germanium as the main driver of the initial steps of surface degradation of $Cr_2Ge_2Te_6$.