**Introduction**

Oxide layer is usually formed easily on the surface of materials when exposed to oxygen/moisture. Surface oxidation is more important in thin 2D materials due to significant thickness of oxide layer compare to thickness of material itself which is usually few atoms thick. Properties of these materials considerably changes by surface oxidation.

Here, we studied the surface oxidation of two dimensional Sb2Te3 in different oxygen containing environments.

**Experiment 1: Synthesis of Sb2Te3**

1. 0.48g PVP(MW360000) was added Ethylene Glycol.
2. Then 0.6 g NaOH was added to above solution.
3. 0.26 g SbCl3 and 0.28 g TeO2 was used as metal precursors.
4. The mixture was transferred to an autoclave and hydrothermal process was done at 200℃ for 20h.

**Material characterization**

![Thickness measurement](image)

**Experiment 2: Moisture effect (on-shelf period)**

**Experimental details**

- Sb2Te3 was washed with IPA and water separately
- Materials was kept on- self in lab condition
- On-shelf duration effect on different samples was investigated

**Results**

- Keeping material on shelf had not significant effect on oxide layer
- No significant difference was observed between the materials initially washed with different solvents

**Experiment 3: Dispersion condition (different solvents)**

**Experimental details**

- Samples were dispersed in different solvents (IPA, IPA/water, water)
- The oxide layer formation was studied for different solvents

**Results**

- Oxidation layer is formed quicker when Sb2Te3 nanosheets are dispersed in IPA compare to water
- The rate of oxide layer formation is between water and IPA when the co-solvents is used

**Experiment 4: Dispersion condition (different time)**

**Experimental details**

- Samples were kept in different solvents (IPA, IPA/water, water)
- The oxide layer formation was monitored by time

**Results**

- Intensity of TeO2 peak at 575.9 eV is compared for the samples left in different solvents for 6h and 19 h. the peak intensity has increased by:
  - by 44.7% for IPA
  - by 50.7% for IPA/water
  - by 59.0% for water

**Conclusion**

Sb2Te3 can be kept on-shelf for short time without any significant oxidation. If dispersing this material is needed, water is a better solvent than IPA.