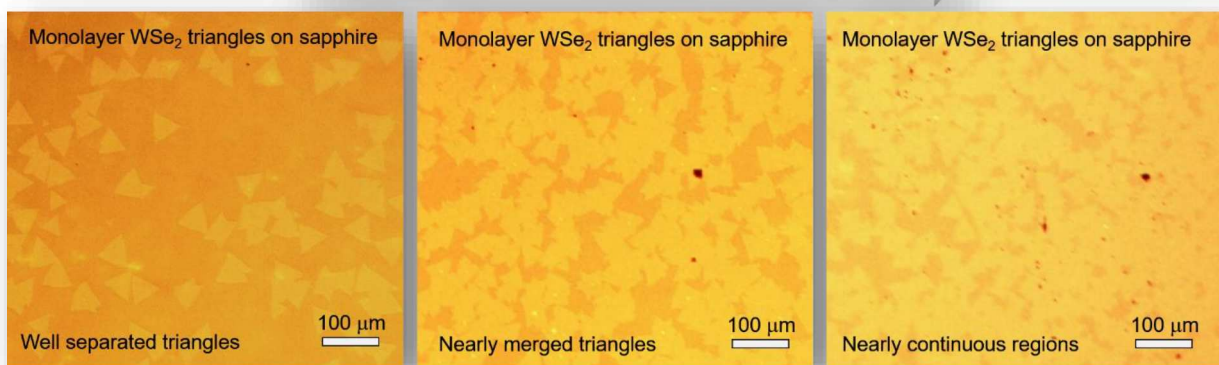


## 2. Monolayer WSe<sub>2</sub> Triangles on c-cut Sapphire (Product code: *MLWSe2TriSapp*)

**Description.** Isolated monolayer thickness WSe<sub>2</sub> are grown onto c-cut (0001) sapphire substrates. This particular product contains monolayer thickness WSe<sub>2</sub> triangular flakes randomly distributed across sapphire substrate. While some regions reach continuity with coalesced WSe<sub>2</sub> triangles, this sample contains well-separated triangles for advanced spectroscopy, microscopy, and electronic measurements. Synthesized monolayer WSe<sub>2</sub> triangles are highly luminescent and Raman spectroscopy studies also confirm the monolayer thickness.

These regions can be observed on the same sample



### Sample Properties.

<b>Sample size</b>	1cm x 1cm square shaped
<b>Substrate type</b>	(0001) c-cut sapphire
<b>Coverage</b>	Isolated and partially merged monolayer triangles
<b>Electrical properties</b>	1.62 eV Direct Bandgap Semiconductor
<b>Crystal structure</b>	Hexagonal Phase
<b>Unit cell parameters</b>	$a = b = 0.327 \text{ nm}$ , $c = 1.295 \text{ nm}$ , $\alpha = \beta = 90^\circ$ , $\gamma = 120^\circ$
<b>Production method</b>	Low pressure Chemical Vapor Deposition (LPCVD)
<b>Characterization methods</b>	Raman, photoluminescence, TEM, EDS

### Specifications.

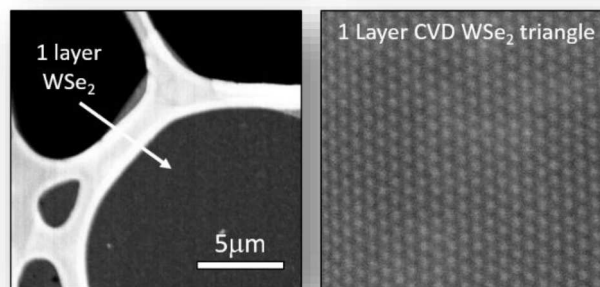
- Identification.** Well-separated WSe<sub>2</sub> domains across c-cut sapphire
- Physical dimensions.** one centimeter in size. Larger sizes up to 2-inch wafer-scale available upon requests.



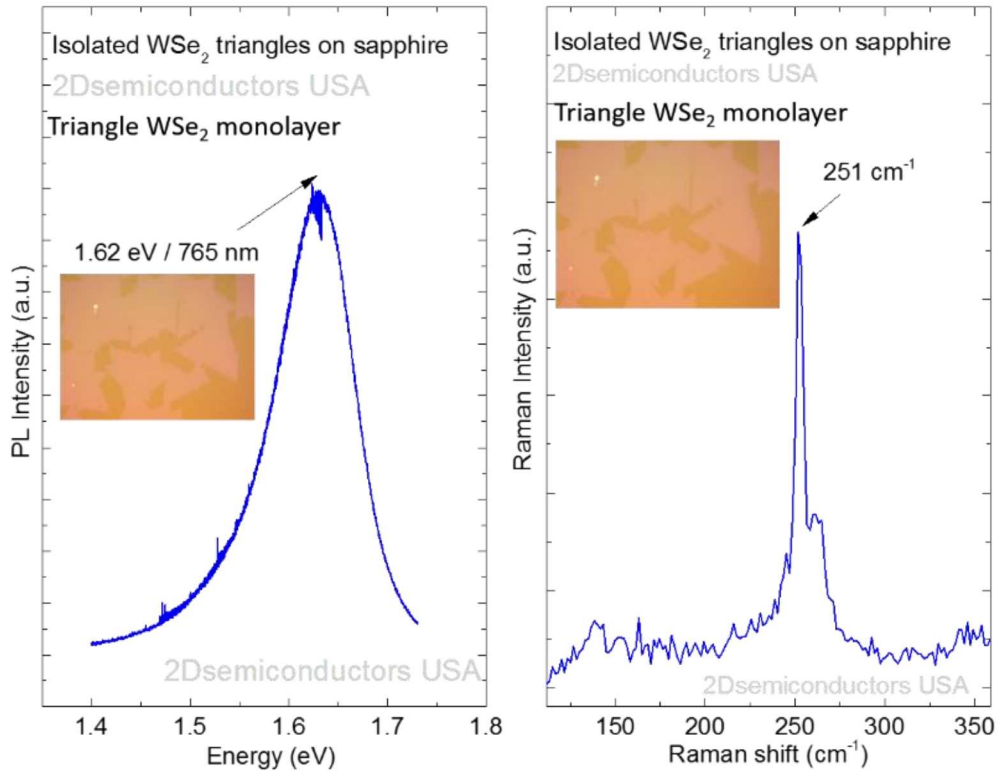
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- **Smoothness.** Atomically smooth surface with roughness < 0.22 nm.
- **Uniformity.** Highly uniform surface morphology
- **Purity.** 99.9995% purity as determined by nano-SIMS measurements
- **Reliability.** Repeatable Raman and photoluminescence response
- **Crystallinity.** High crystalline quality, Raman response, and photoluminescence emission comparable to single crystalline monolayer flakes.
- **Substrate.** c-cut Sapphire but our research and development team can transfer WSe<sub>2</sub> triangles onto variety of substrates including PET, quartz, and SiO<sub>2</sub>/Si without significant compromising of material quality.
- **Support.** 2Dsemiconductors USA is an American owned, regulated, and operated company. Our customers are well-protected by international as well as strict American customer laws and regulations. We give full technical support and guarantee your satisfaction with our well-established customer
- **Defect profile.** WSe<sub>2</sub> monolayer triangles do not contain intentional dopants or defects. However, our technical staff can produce defected WSe<sub>2</sub> using  $\alpha$ -bombardment technique.

**Supporting datasets** [for 100% Full area coverage on SiO<sub>2</sub>/Si ([Product code: MLWSe2TriSapp](#))]



Transmission electron images (TEM) acquired from CVD grown WSe<sub>2</sub> (triangular) monolayers on sapphire confirming highly crystalline nature of monolayers



Room temperature photoluminescence spectroscopy (PL) and Raman spectroscopy (Raman) measurements performed on CVD grown WSe<sub>2</sub> triangle monolayers on c-cut sapphire. Raman spectroscopy measurement confirm monolayer nature of the CVD grown samples and PL spectrum display sharp and bright PL peak located at 1.62 eV in agreement with the literature.