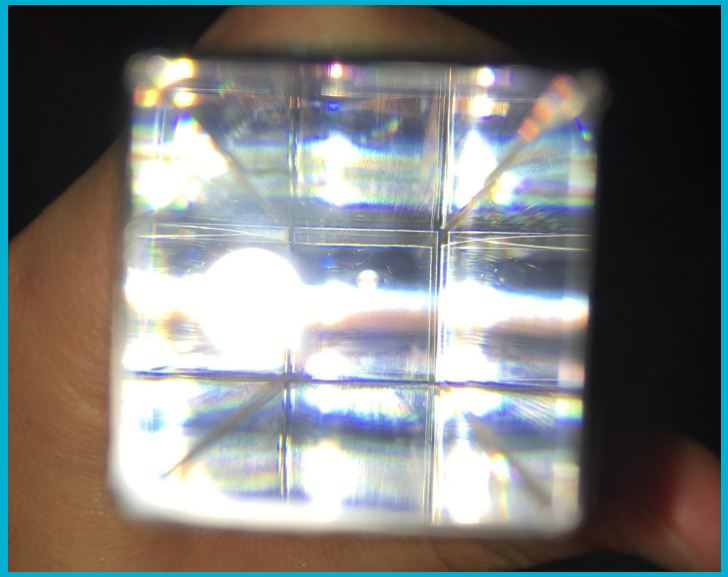
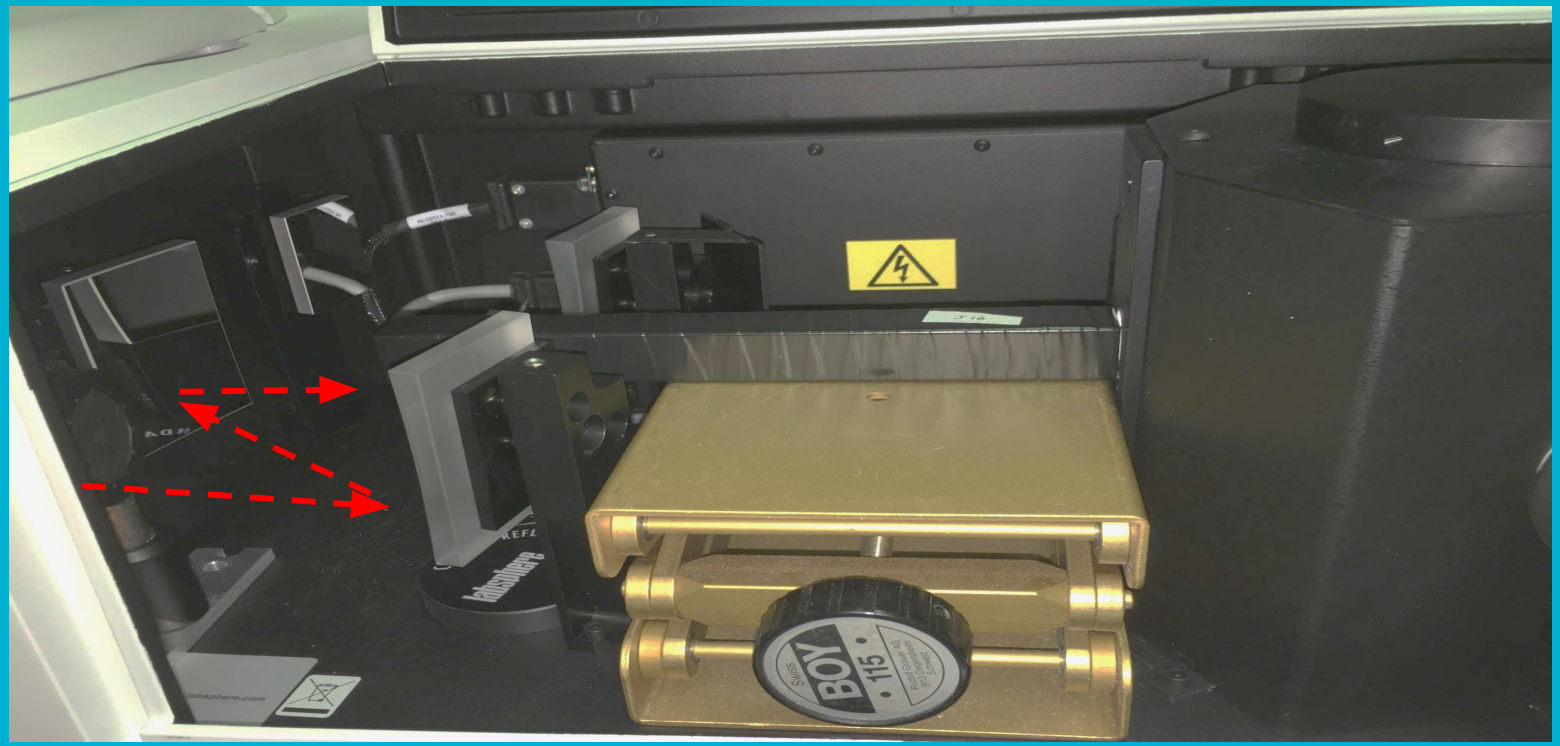
J16, J18, J19, J20

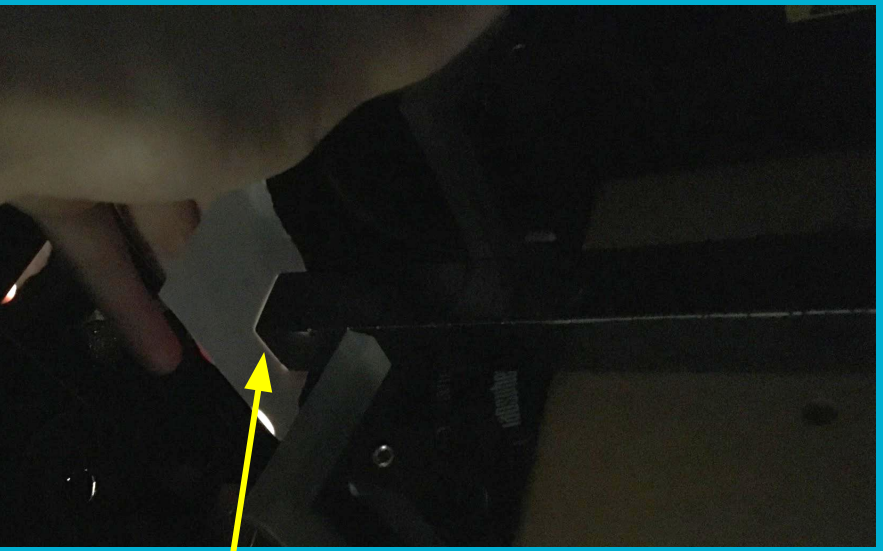


Analysis of Uncertainty in Spectrometer

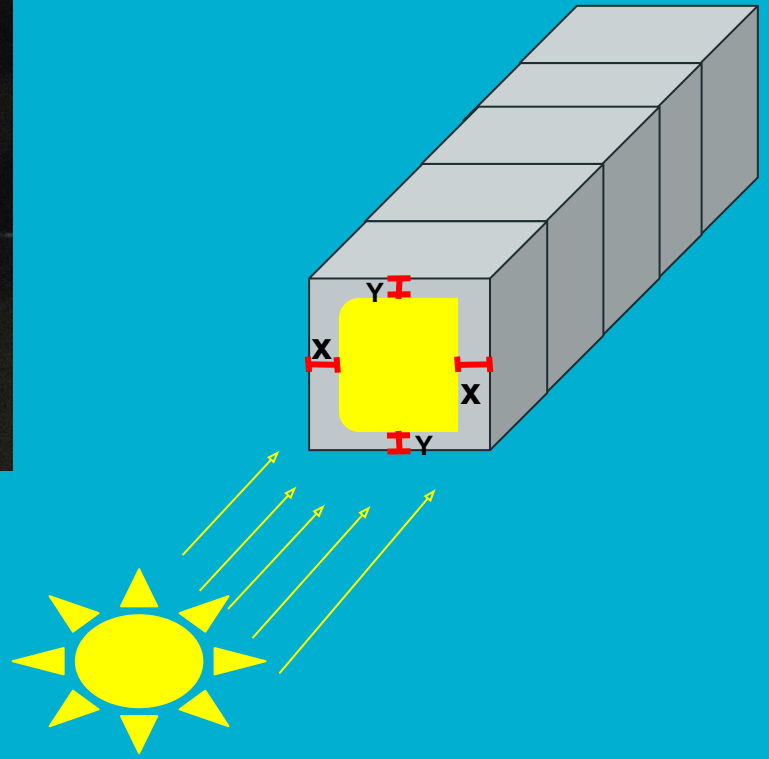
Overall Setup



Alignment



Minimal light leakage



Brief Procedure

-Used pencil to mark location of iris base and table that supported crystal

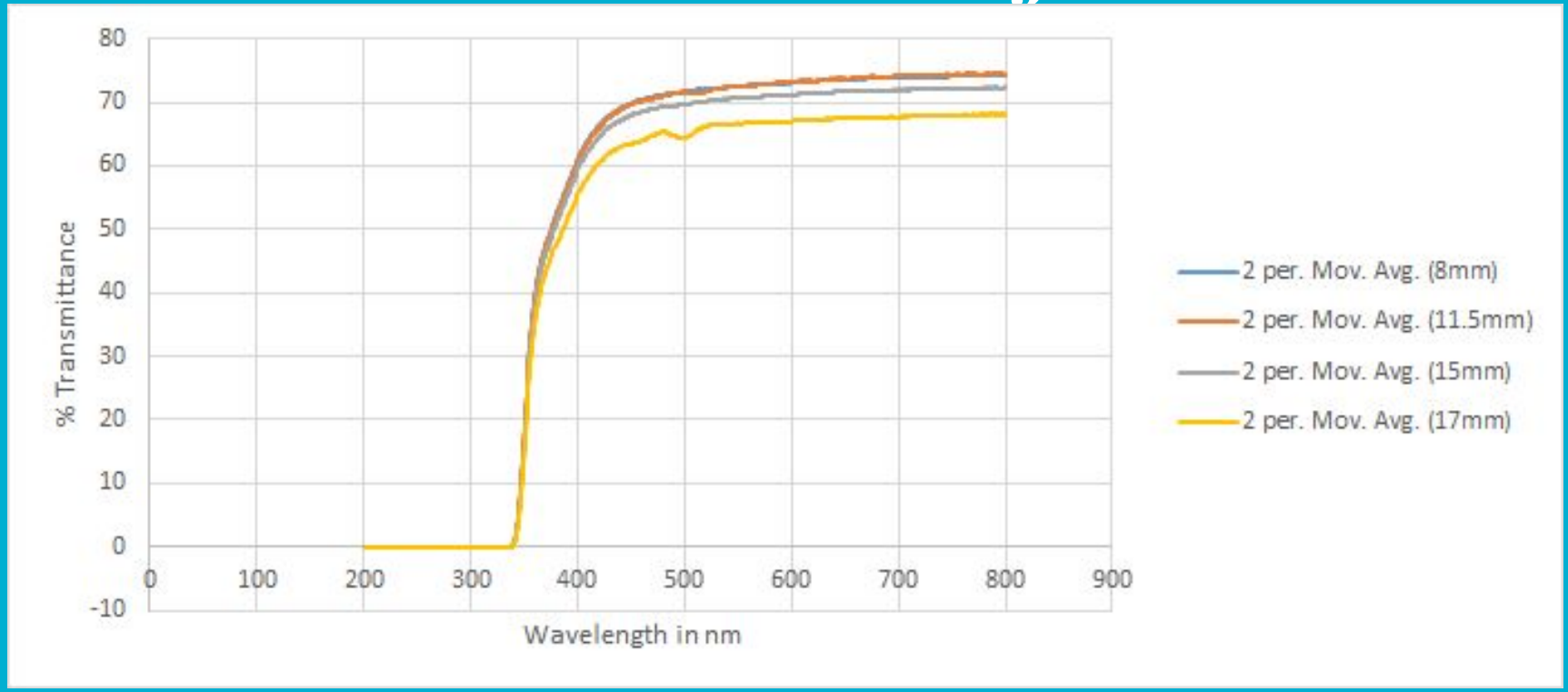
-Height of table: 90.79mm

-Aligned the crystal straight, then used pencil to trace its location on table

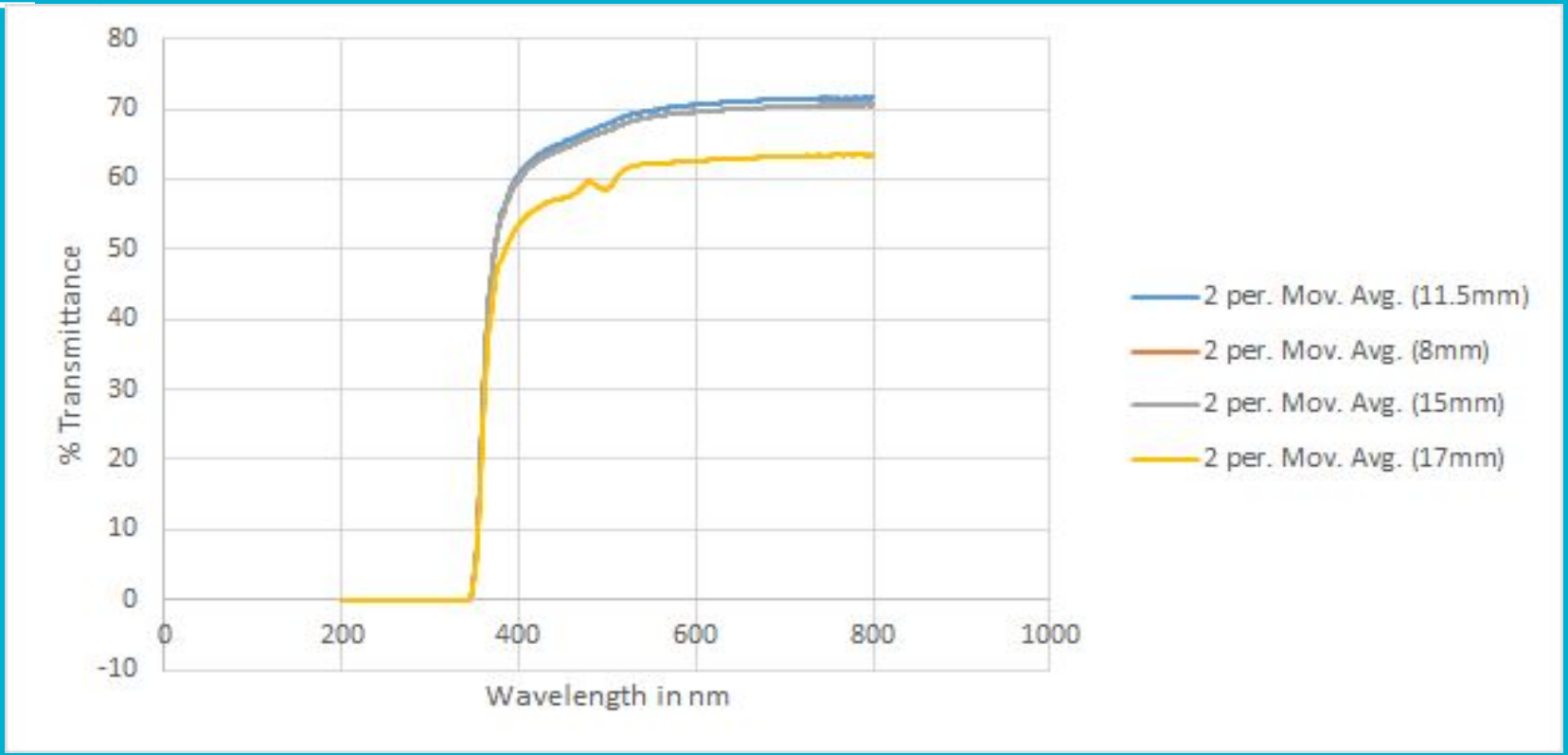
-Adjusted the iris to different diameters using lever

-Autozeroed between every trial

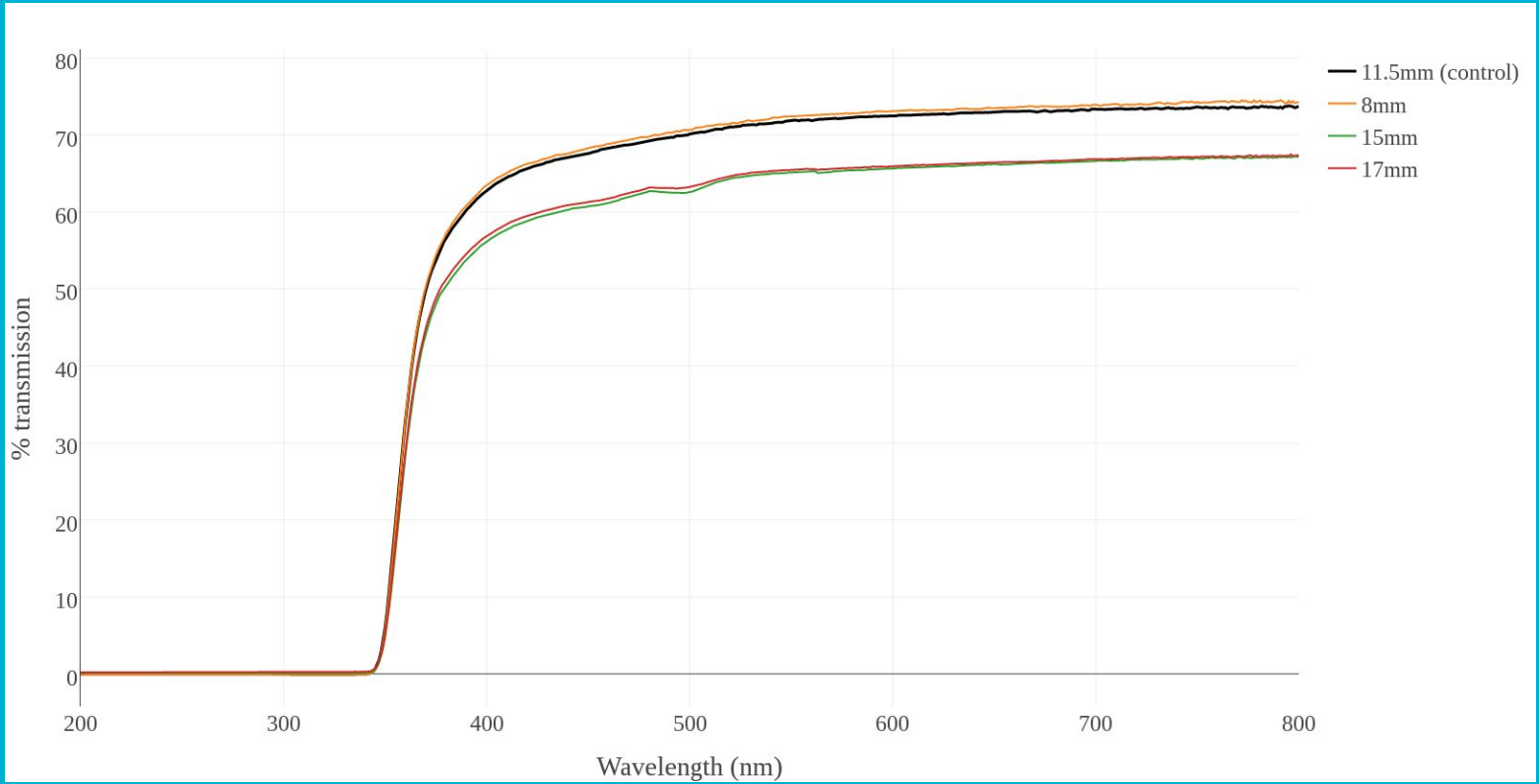
Effect of Iris Diameter on Longitudinal Light Transmission: J16



Effect of Iris Diameter on Longitudinal Light Transmission: J18



Effect of Iris Diameter on Longitudinal Light Transmission: J19



Effect of Iris Diameter on Longitudinal Light Transmission in 420 nm

Crystal Number	Iris Diameter in mm +/- .5 mm				Max error range
	8.0	11.5	15	17	
J16	66.301%	65.988%	64.519%	60.461%	5.840%
J18	62.466%	63.209%	62.467%	55.841%	7.368%
J19	66.239%	65.632%	58.906%	59.470%	6.769%
AVG	65.002%	64.943%	61.964%	58.591%	6.411%

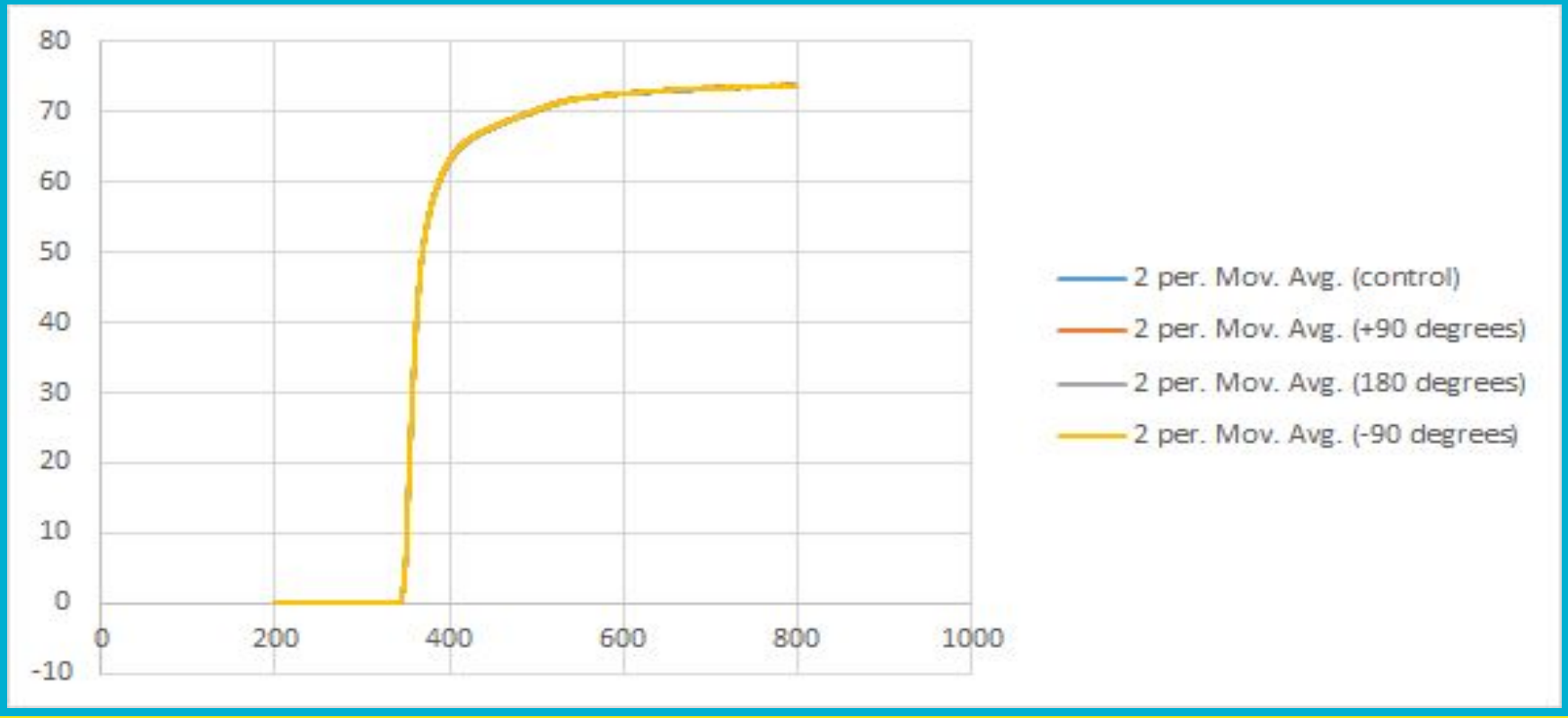
Brief Procedure

-Rotated the crystal (the crystal's length was axis of rotation)

-Positive angles=away from us

-Negative angles=toward us

Effect of Crystal Rotation on Light Transmittance: J19

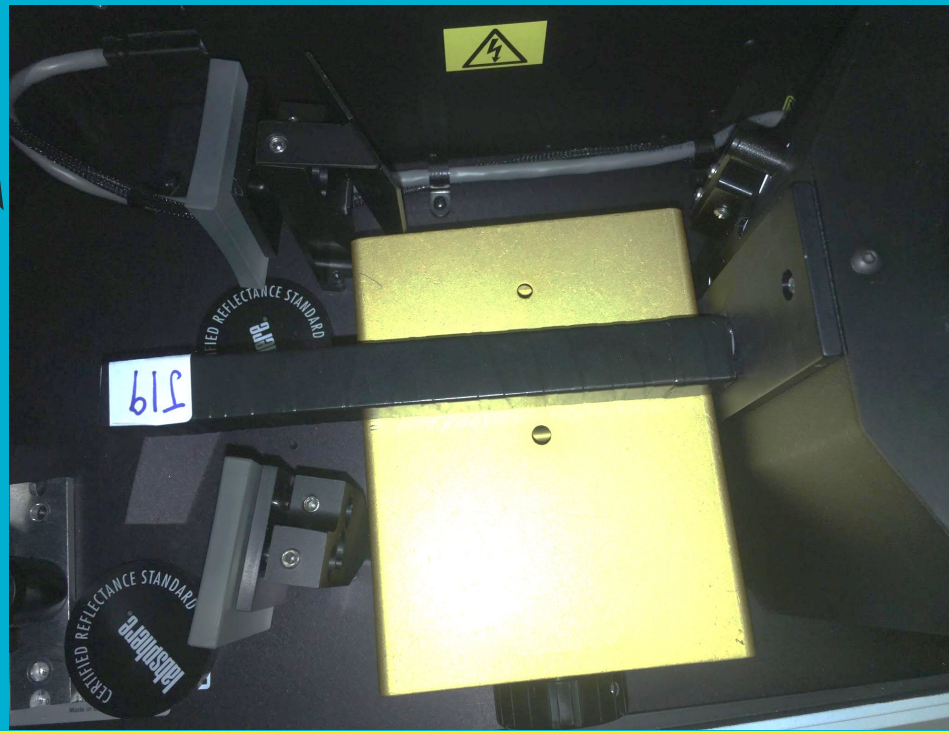


Brief Procedure

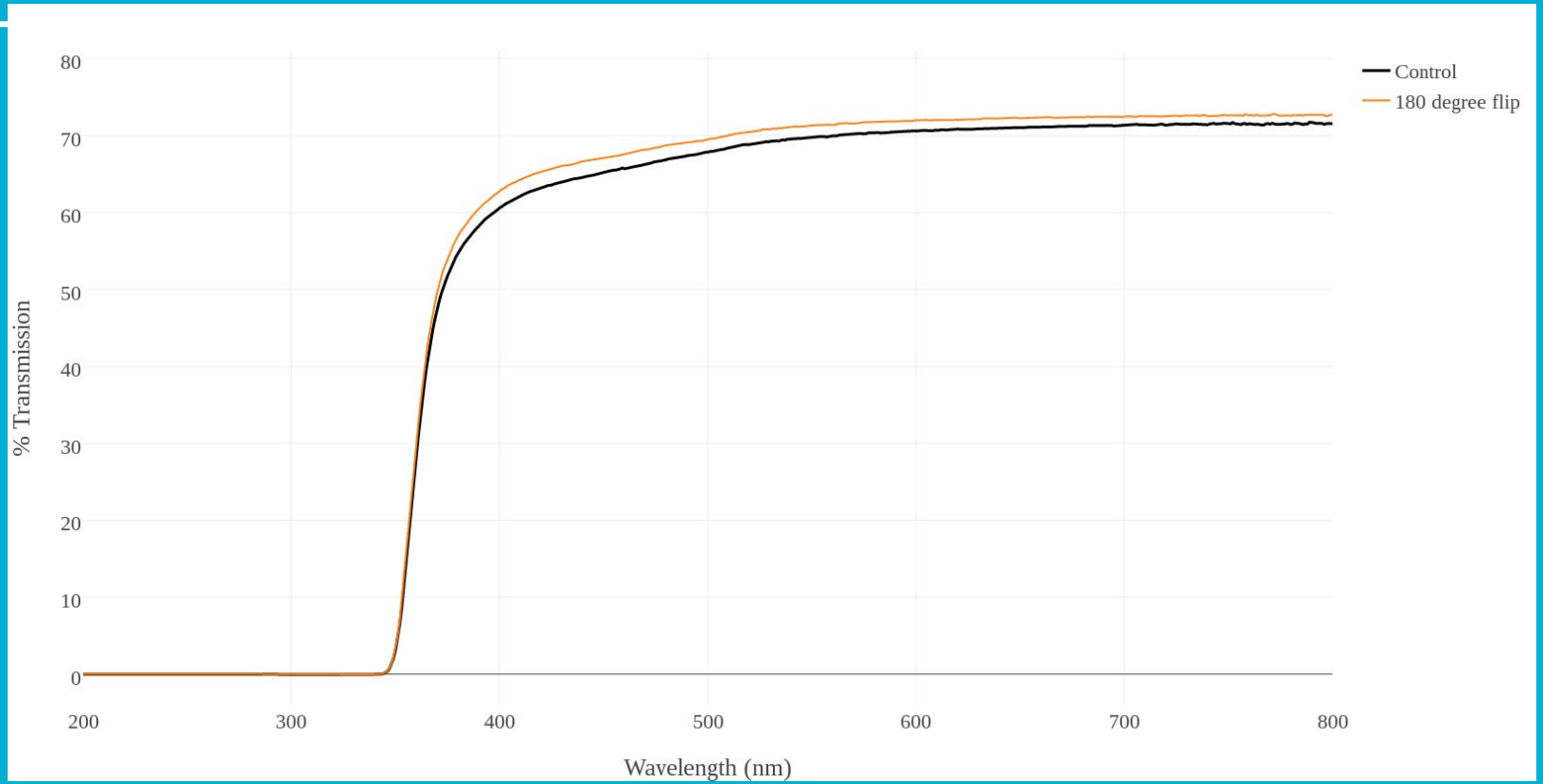
-Flipped crystal so the back became the front

-Side of crystal that was touching the table remained the same

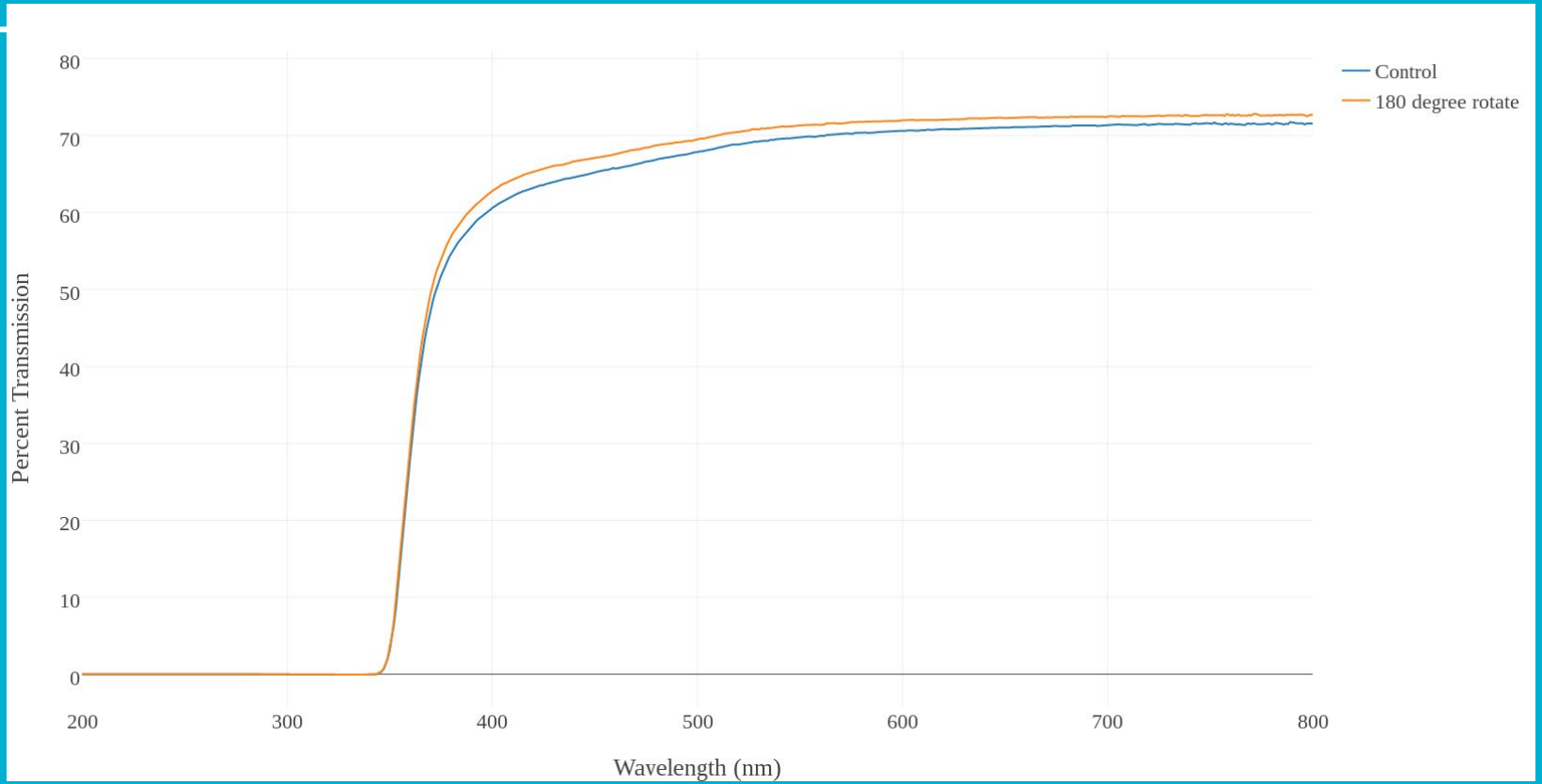

J19
CERTIFIED REFLECTANCE STANDARD
Labsphere


J19
CERTIFIED REFLECTANCE STANDARD
Labsphere

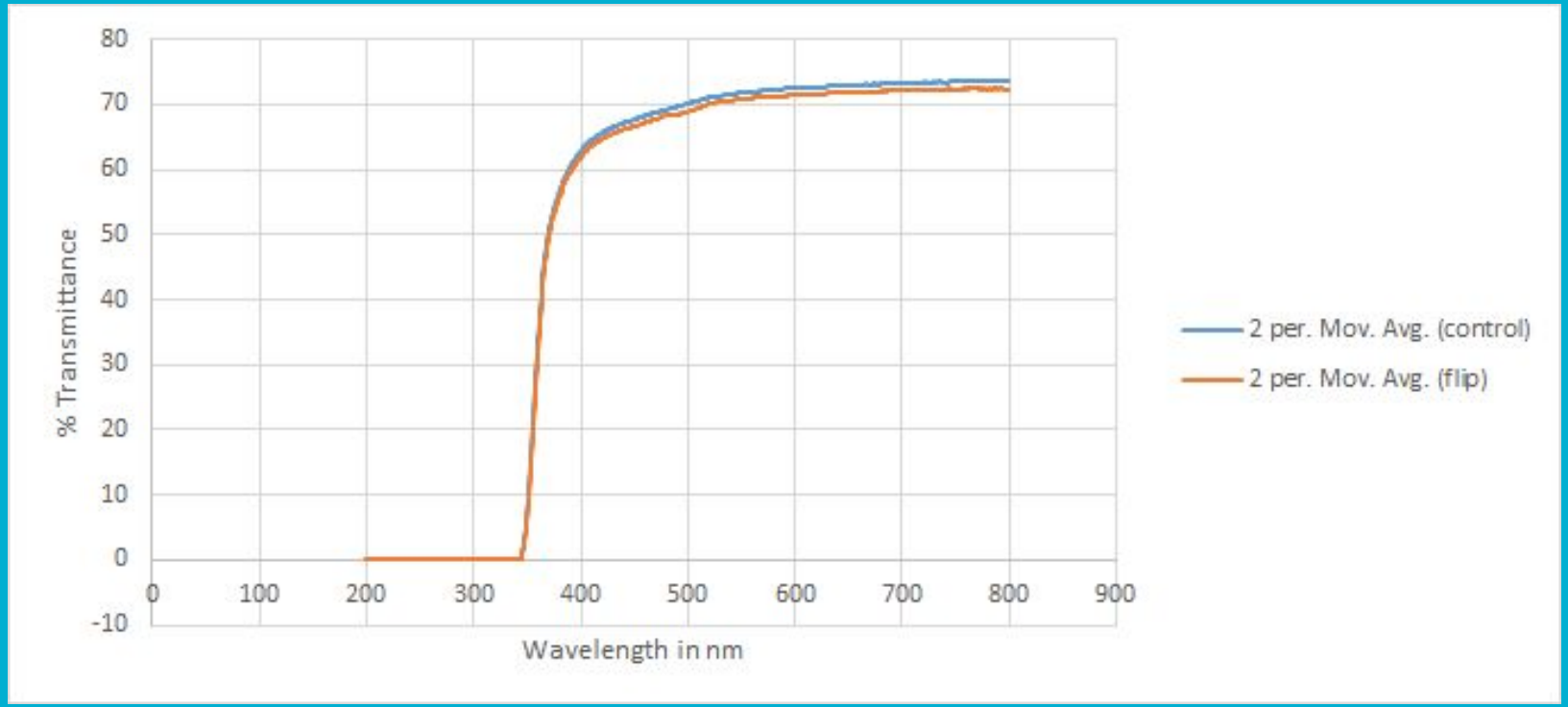
Internal Symmetry of Crystal: J16



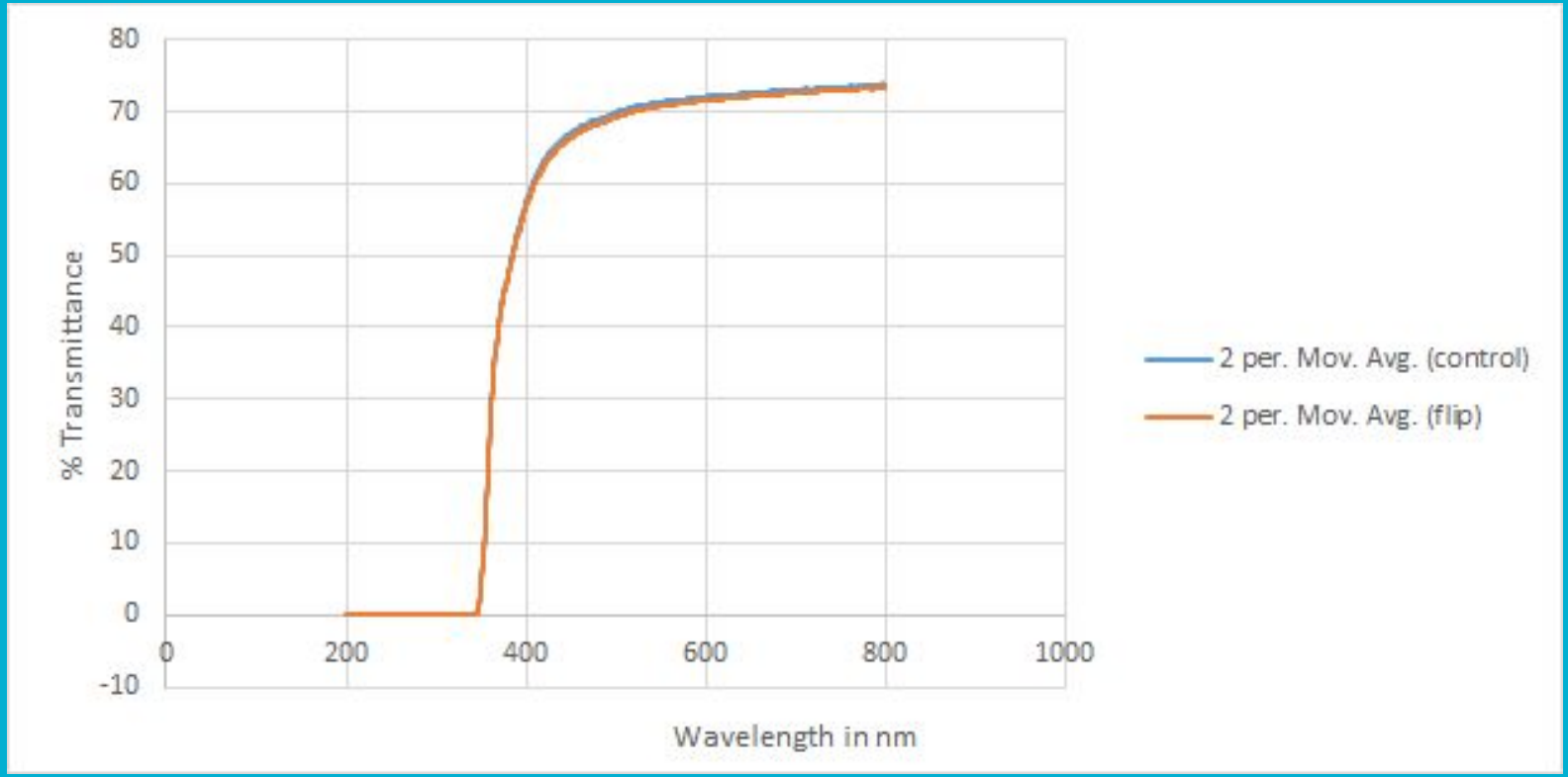
Internal Symmetry of Crystal: J18



Internal Symmetry of Crystal: J19



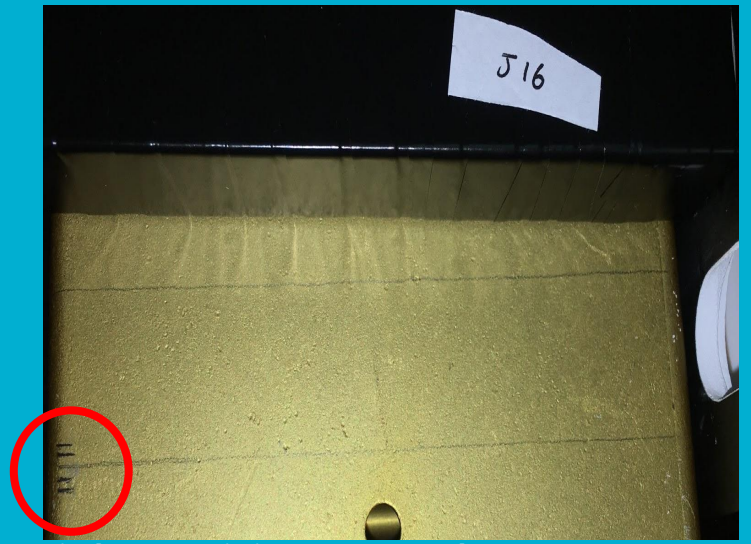
Internal Symmetry of Crystal: J20



Internal Symmetry of Crystal in 420 nm

Crystal #	0°	180	Error range
J16	65.988%	65.917%	±0.07
J18	63.209%	65.338%	± 2.13
J19	65.632%	64.670%	±0.96
J20	62.954%	62.335%	±0.62
avg	64.446%	64.565%	

Brief Procedure



-Marked edge to include tick marks

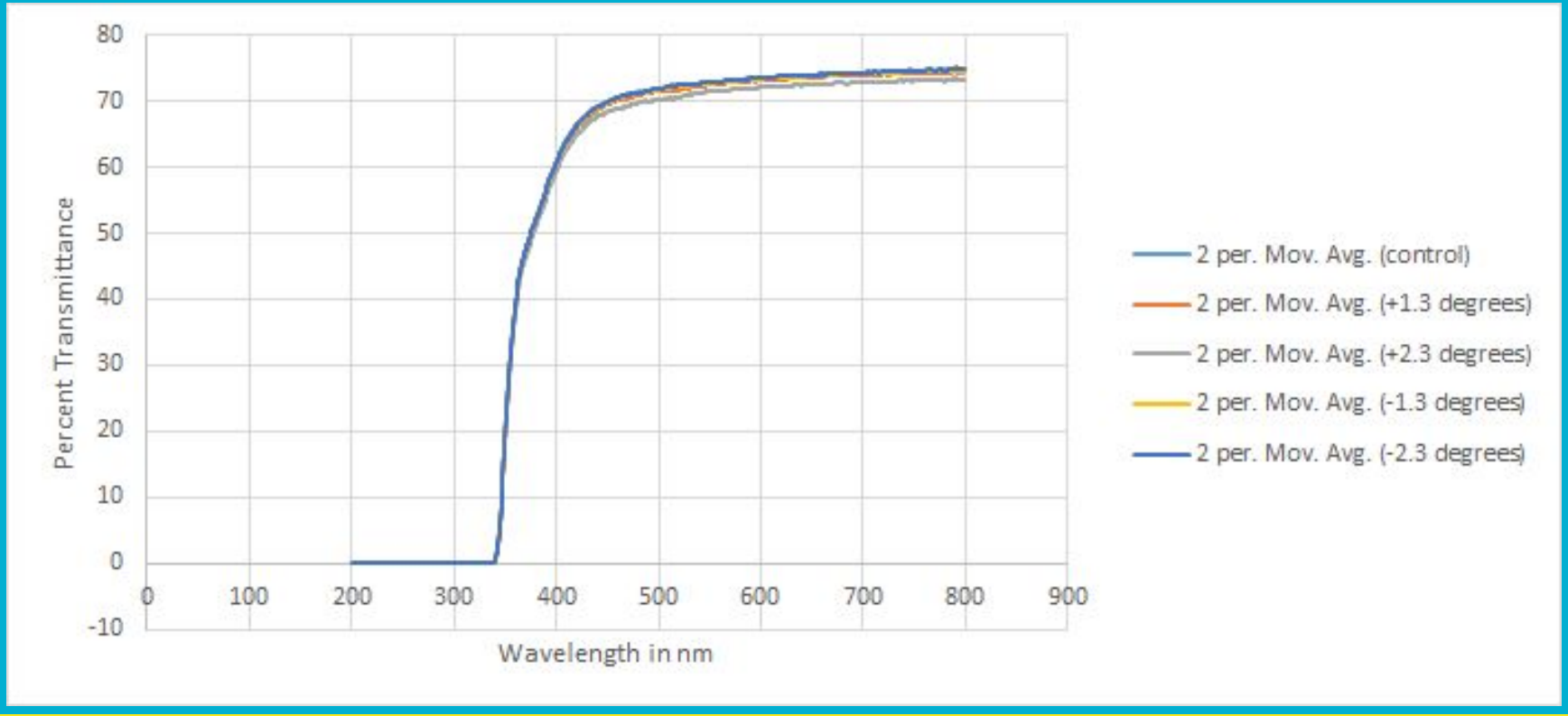
-Positive direction=away from us

-Negative direction=toward us

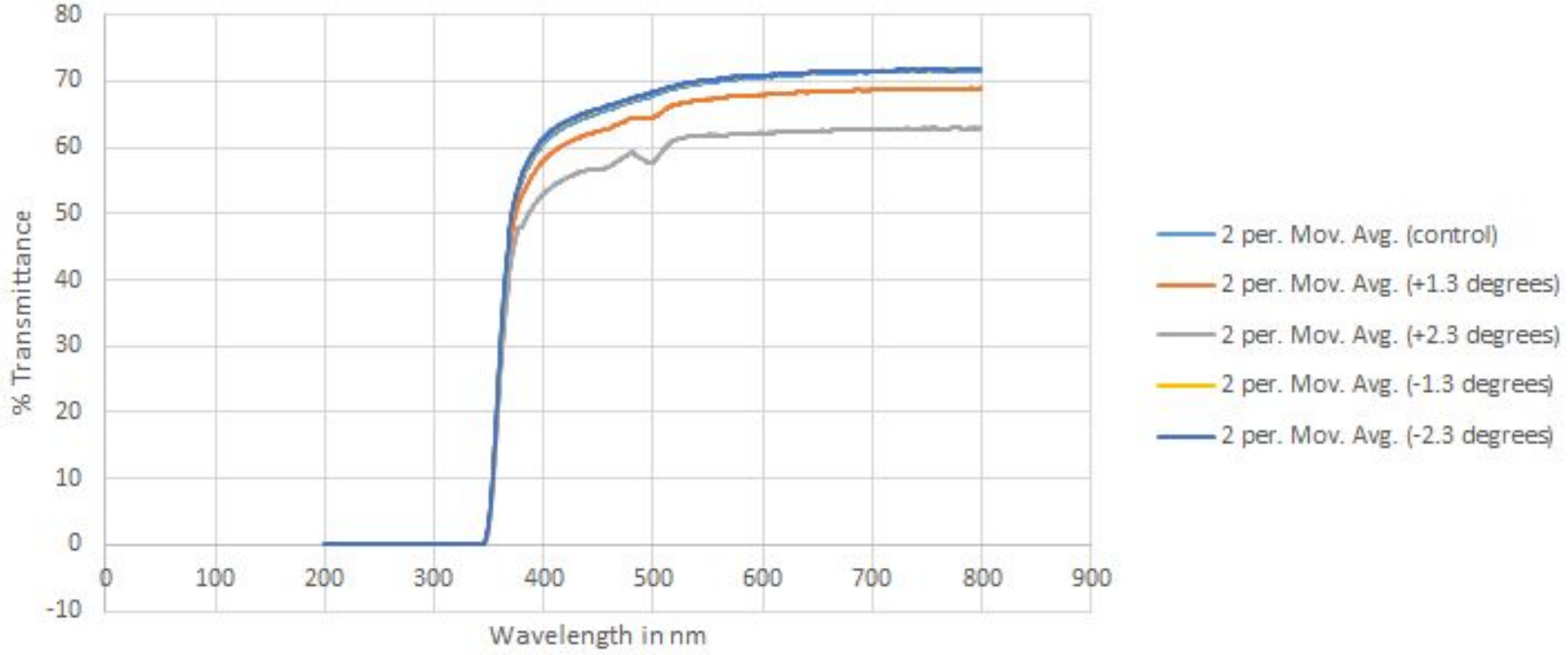
-Used protractor to measure angles from straight position: +1.3 degrees, +2.3 degrees, -1.3 degrees, -2.3 degrees

-Checked alignment to make sure all light was entering the crystal at all degrees

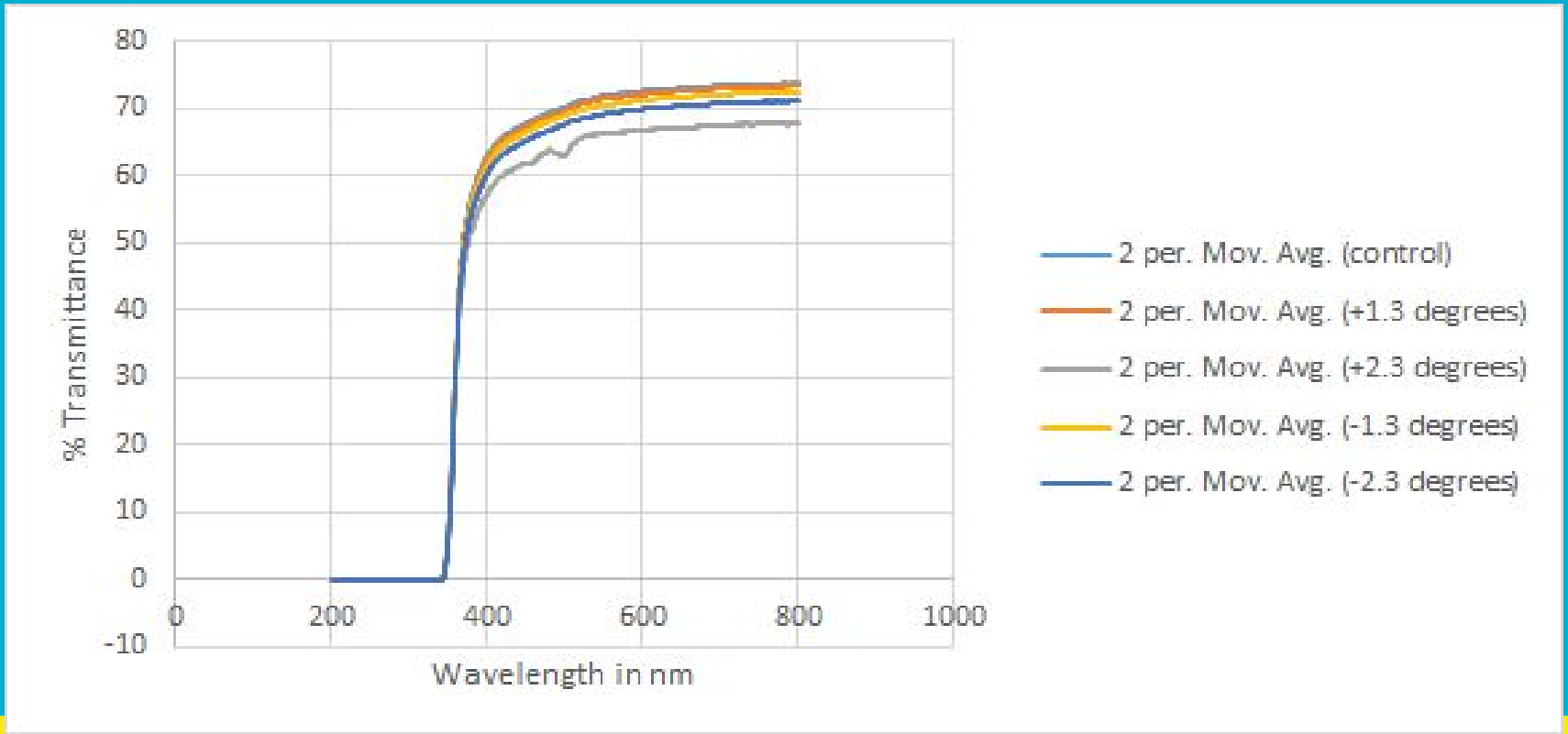
The Effect of Non-Optimal Crystal Angle in Spectrometer on Longitudinal Light Transmission: J16



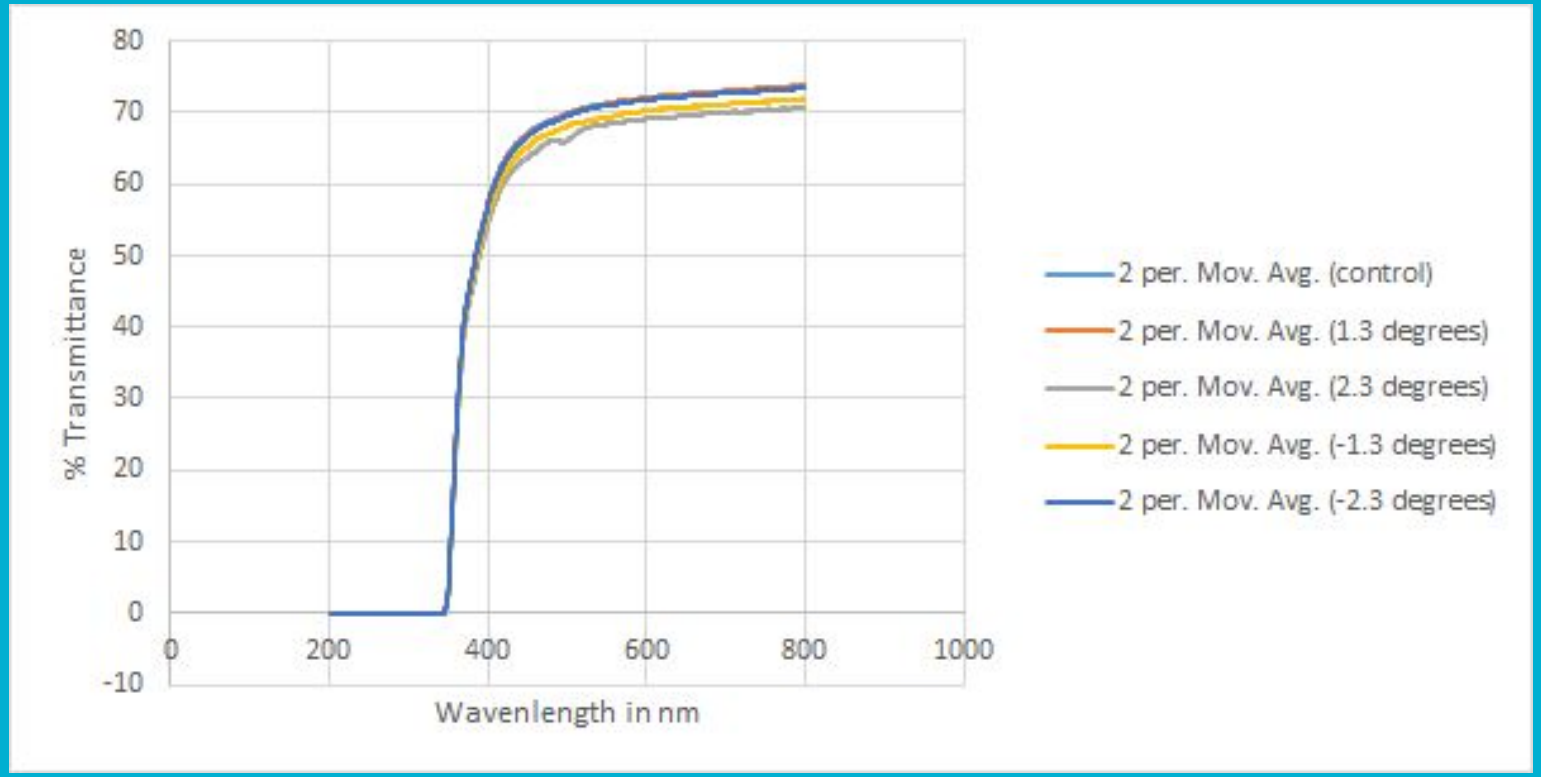
The Effect of Non-Optimal Crystal Angle in Spectrometer on Longitudinal Light Transmission: J18



The Effect of Non-Optimal Crystal Angle in Spectrometer on Longitudinal Light Transmission: J19



The Effect of Non-Optimal Crystal Angle in Spectrometer on Longitudinal Light Transmission: J20



The Effect of Non-Optimal Crystal Angle in Spectrometer on Longitudinal Light Transmission of 420 nm

Crystal Number	Degree of Crystal Placement Off Center					
	0°	1.3°	2.3°	-1.3°	-2.3°	Error range
J16	65.968%	65.874%	64.811%	66.146%	66.262%	±0.71%
J18	63.209%	60.574%	55.329%	63.795%	63.903%	± 7.88%
J19	65.632%	65.180%	59.940%	64.347%	63.077%	±5.69%
J20	62.954%	62.848%	60.081%	61.290%	62.670%	±2.87
Avg Transmitt-ance	64.441%	63.619%	60.040%	63.895%	63.978%	