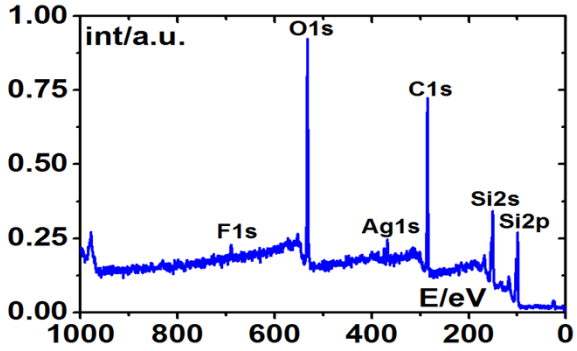
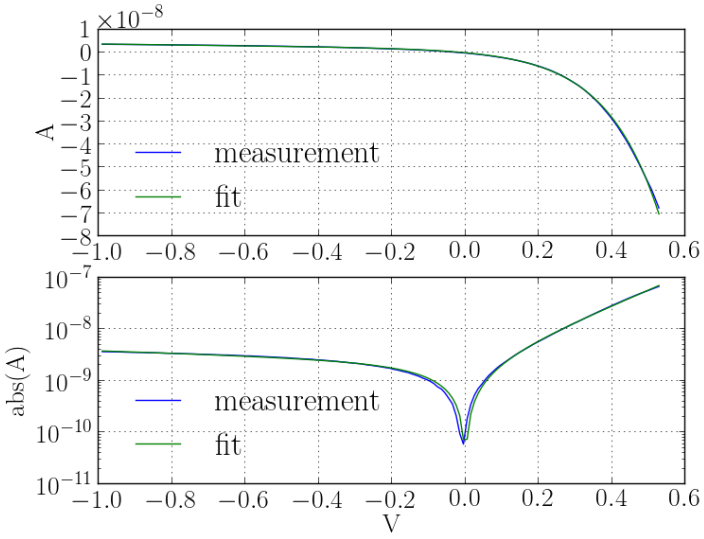
XPS scan of the as etched surface: An overview analysis by XPS showed the surface chemistry of the as etched SiNW. As can be seen from XPS survey scan (Figure 1), F, O and C are present at the surface as a consequence of fluorine based RIE process and storage of the sample under ambient conditions. Due to the large XPS probing spot (diameter: 1 mm) the spectrum shows a small silver (Ag) signal originating from the sample edge where Ag paste was used to electrically connect the sample backside to the specimen holder.



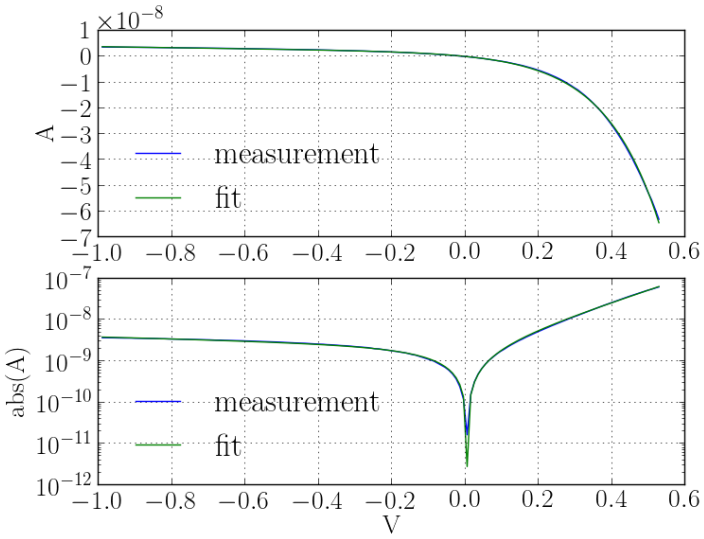
Fits of the I-V characteristics: The challenge of fitting a diode I-V curve is twofold: On the one hand the absolute current values need to be precisely adapted to obtain accurate fit parameters for the serial and parallel resistance. On the other hand the typical solar cell parameters like the open circuit voltage of a diode under illumination have to be accurately reproduced by the fits. For external voltages that are close to the open circuit voltage, only very small absolute currents flow through the device. In consequence, the absolute values of the current are not very well suited to determine the open circuit voltage by the fits. The latter can be much better fitted by fitting the relative changes of the currents. To meet both conditions simultaneously, i.e. accurate fitting of both the absolute current values as well as the relative changes,

$$\sum_l [I_m(V_l) - I_e(V_l)]^2 / |I_e(V_l)|$$

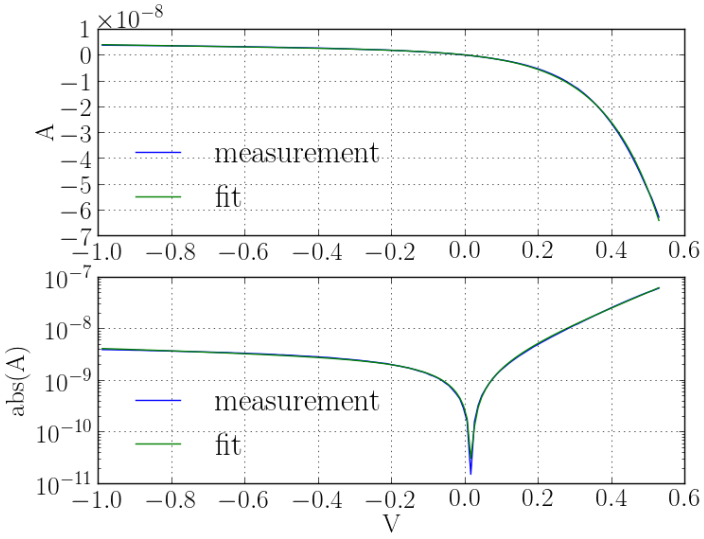
is minimized by the fits. $I_e(V_l)$ are the currents measured for different external voltages V_l. Each fit is started with several different starting values and the best fit is picked automatically. To permit an intuitive judgment of the quality of the fits, all fits are shown, both in linear and in semi-logarithmic scale.



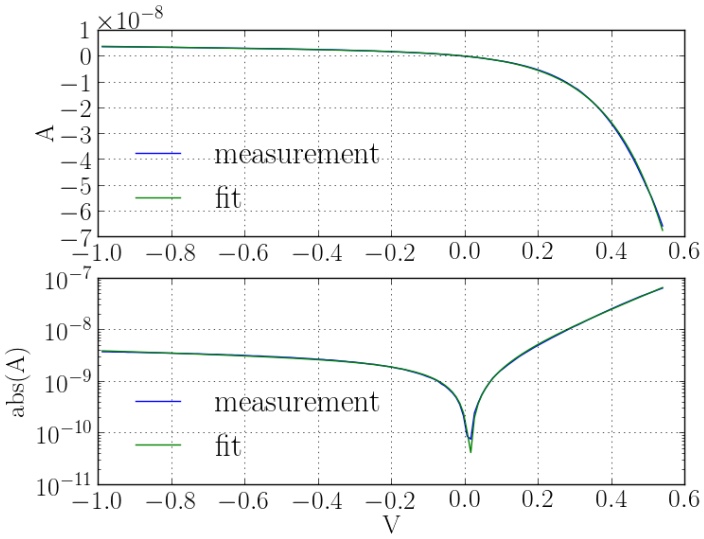
500nm 0nW



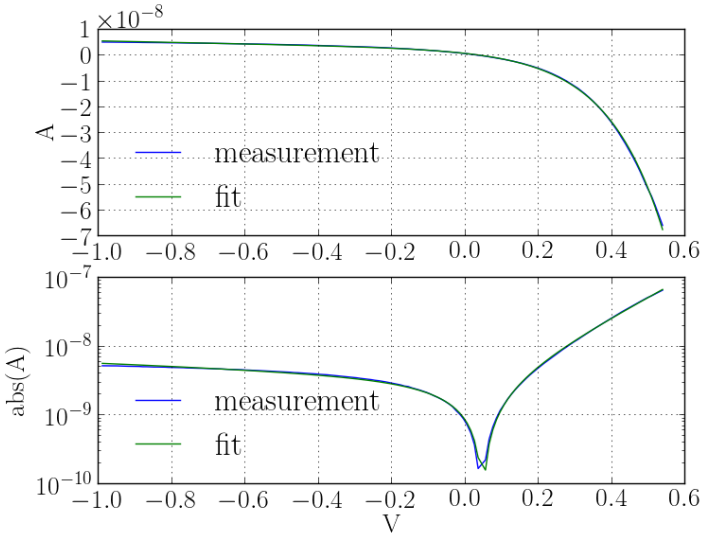
500nm 20.11nW



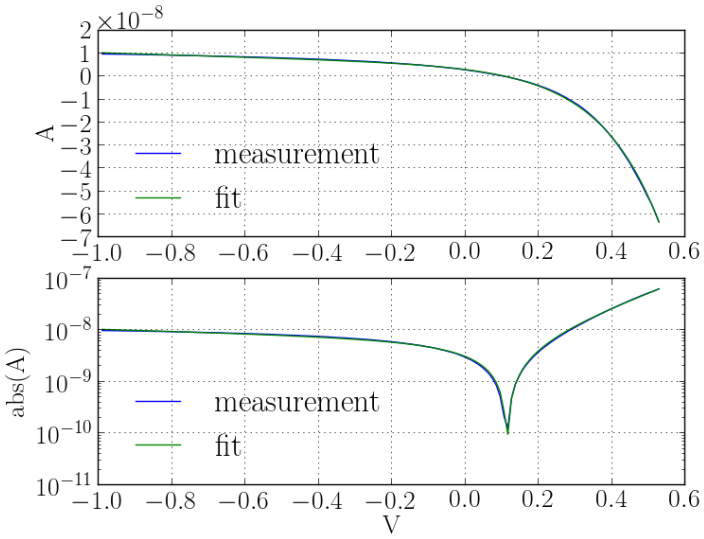
500nm 49.92nW



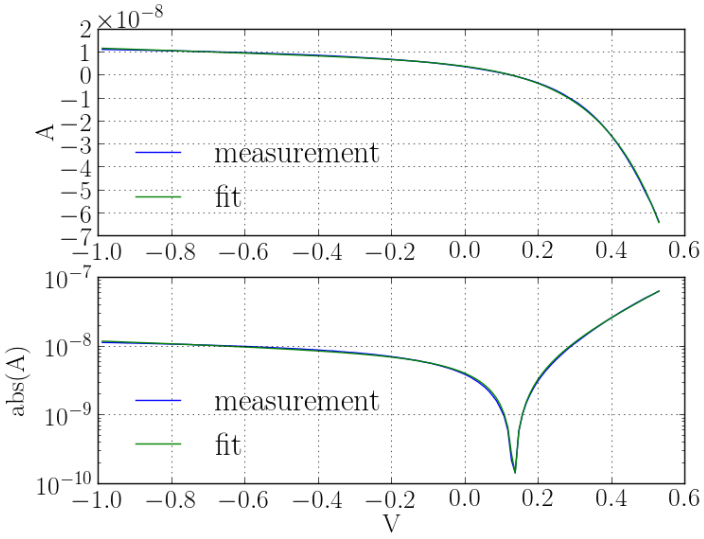
500nm 99.36nW



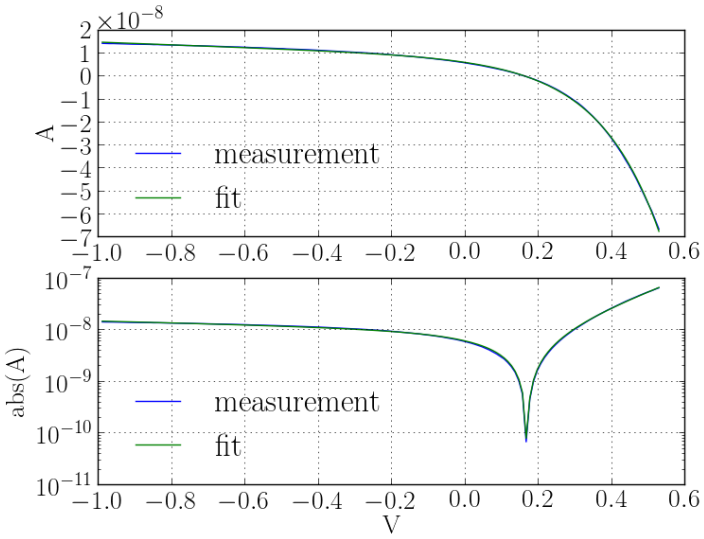
500nm 201.18nW



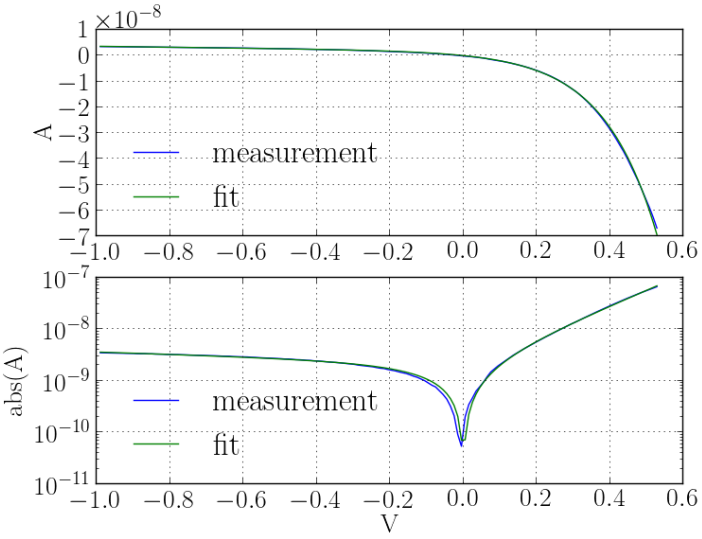
500nm 490.17nW



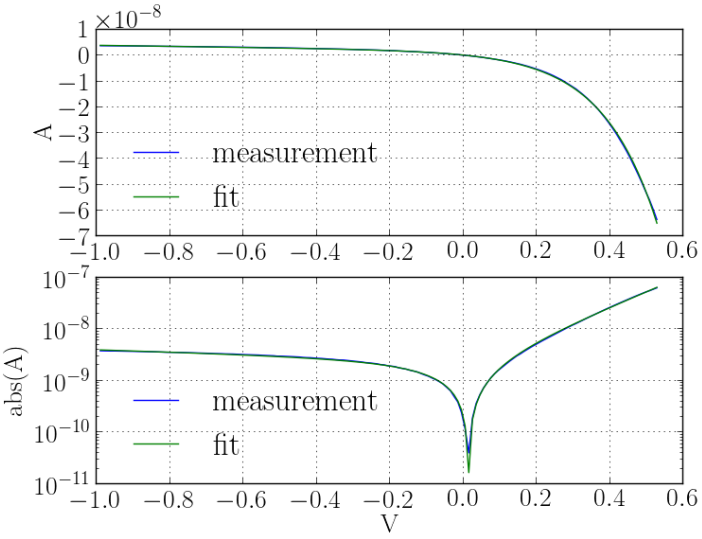
500nm 863.19nW



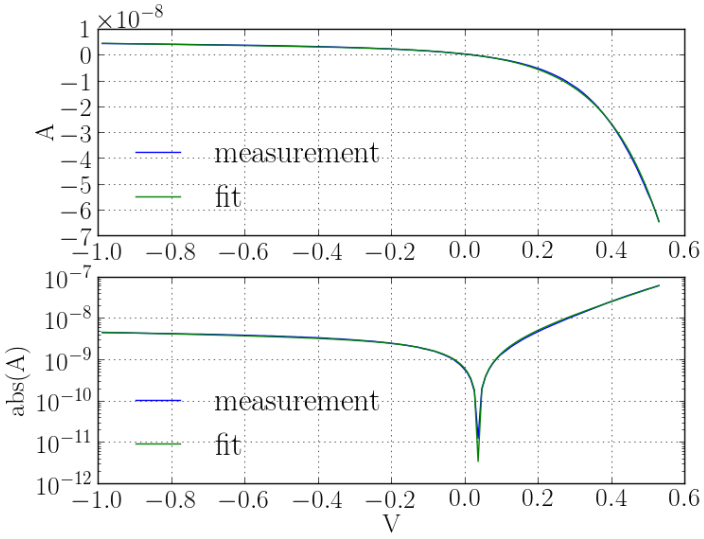
500nm 2207.63nW



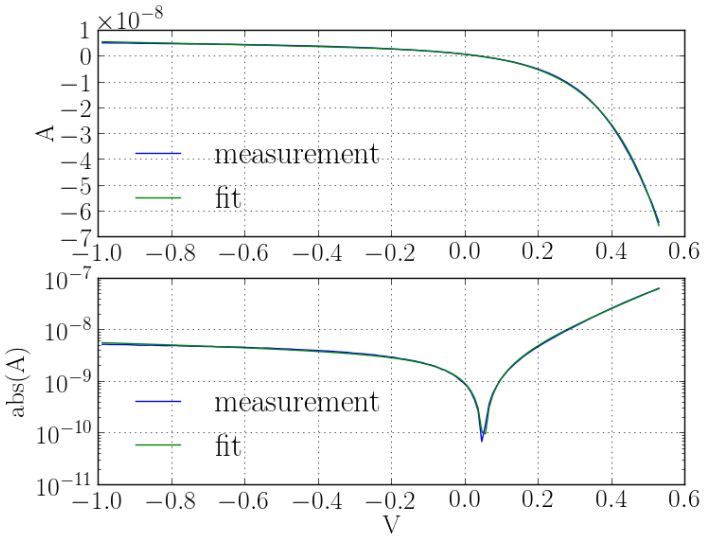
550nm 0nW



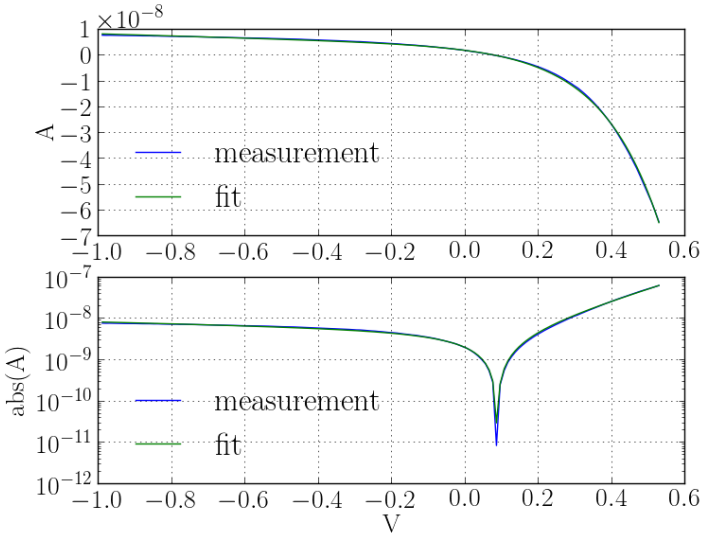
550nm 22.82nW



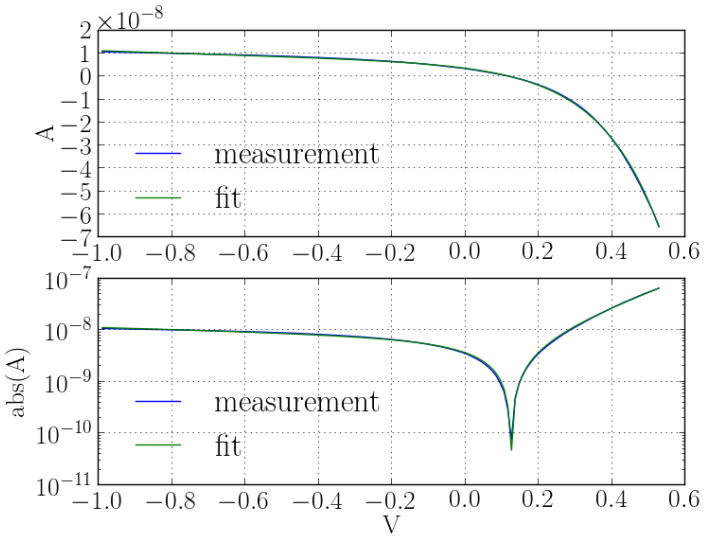
550nm 49.86nW



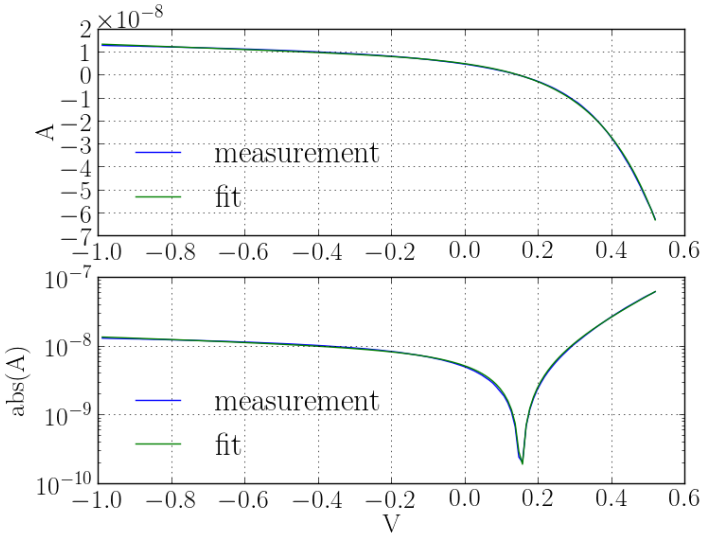
550nm 81.30nW



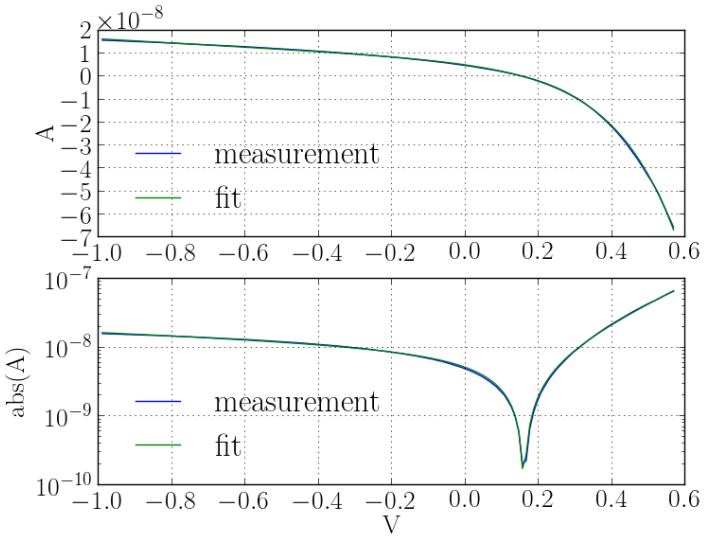
550nm 204.68nW



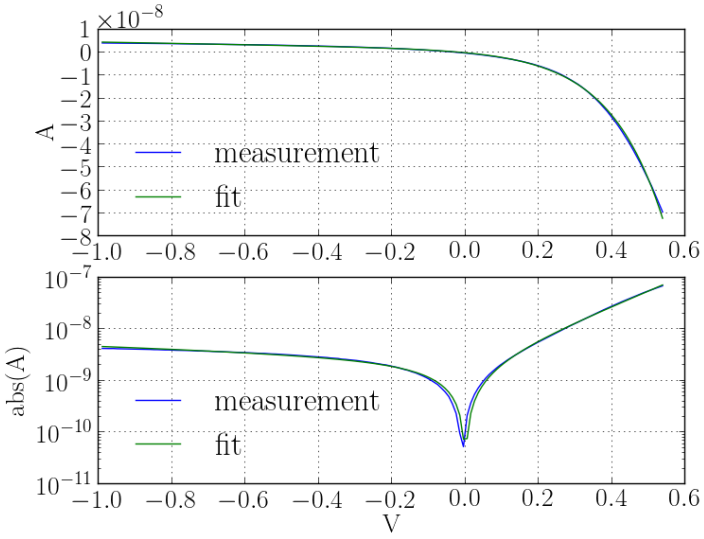
550nm 495.53nW



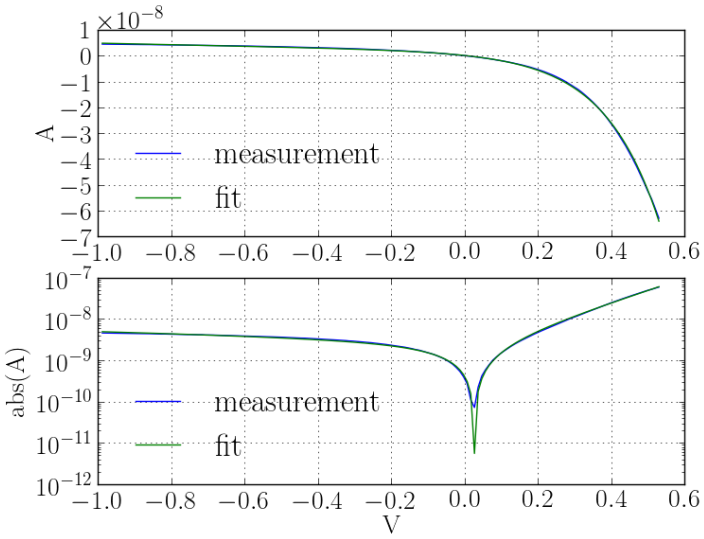
550nm 999.47nW



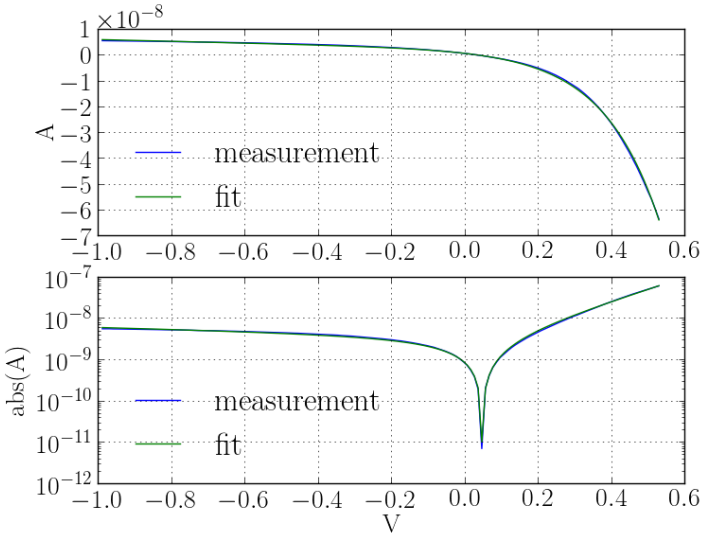
550nm 1999.47nW



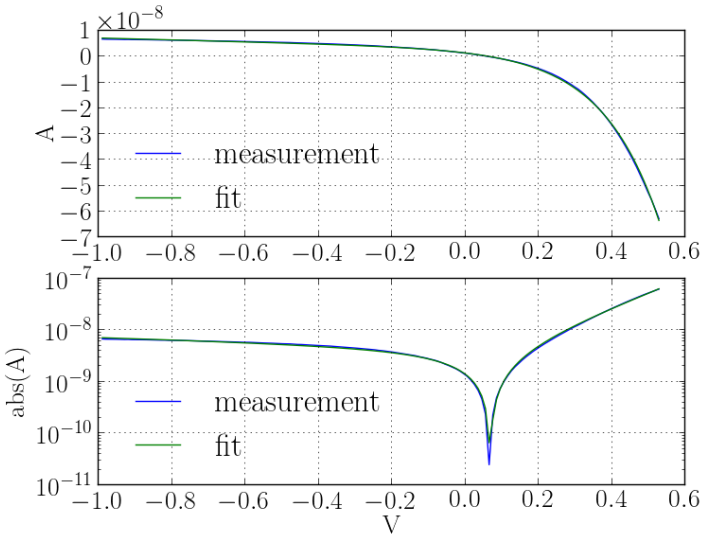
600nm 0nW



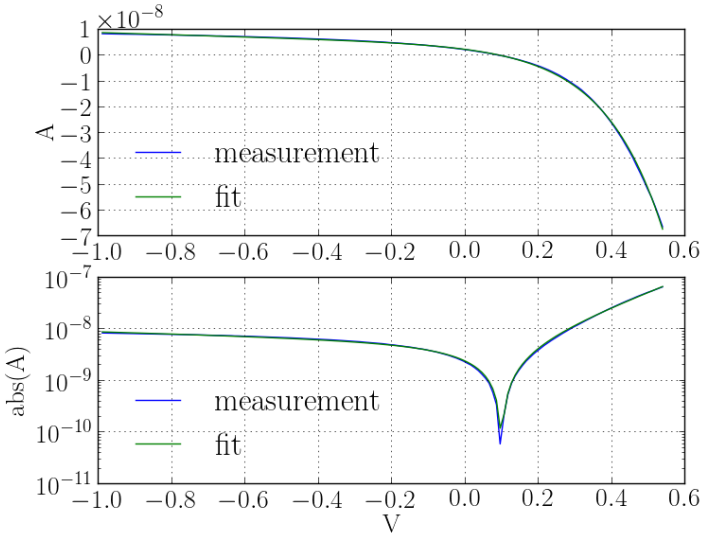
600nm 19.88nW



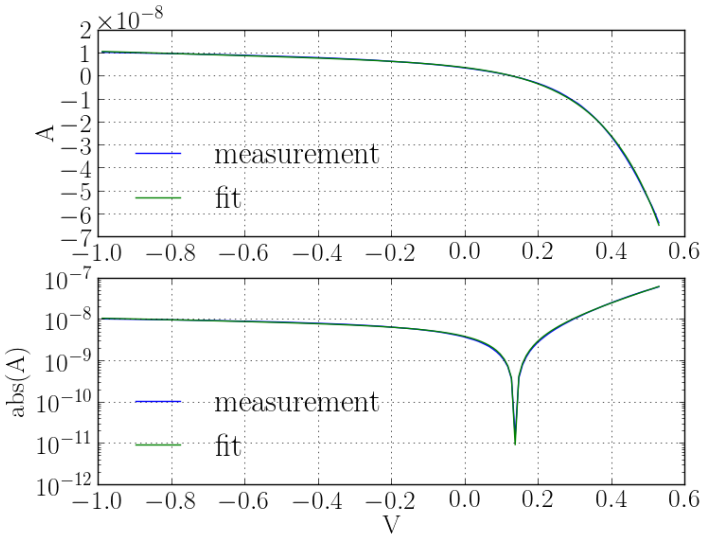
600nm 50.32nW



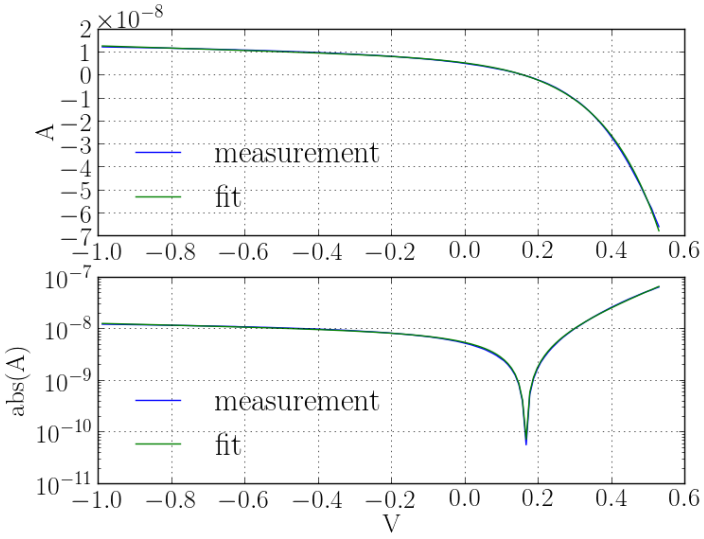
600nm 95.93nW



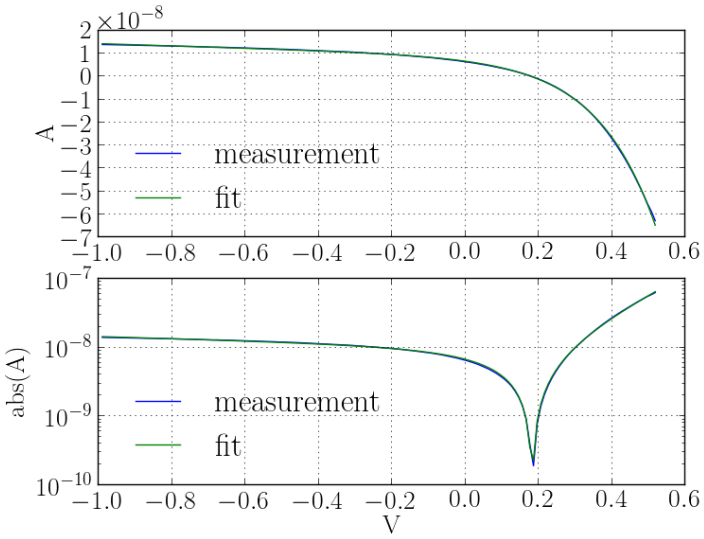
600nm 203.54nW



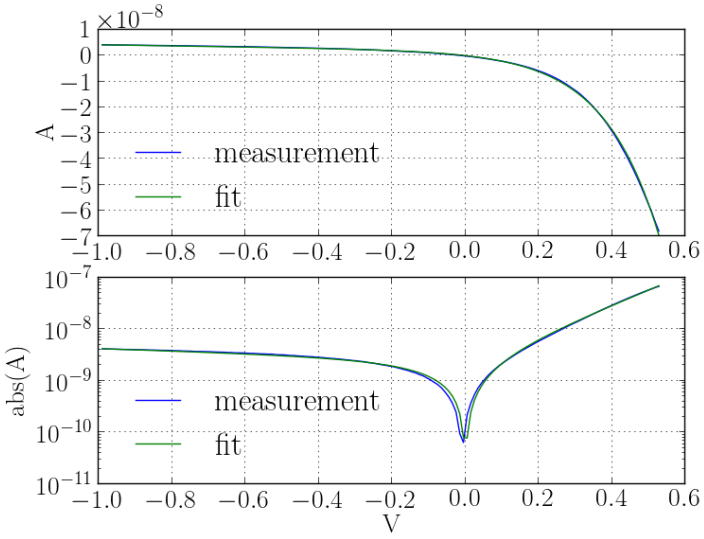
600nm 494.51nW



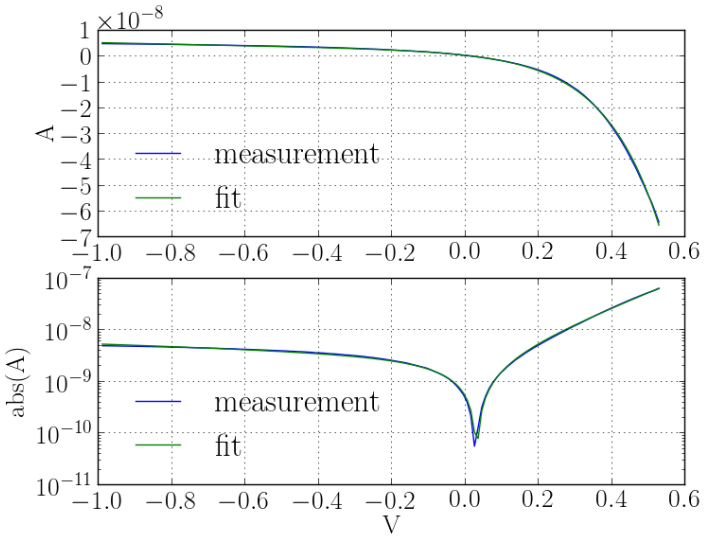
600nm 992.35nW



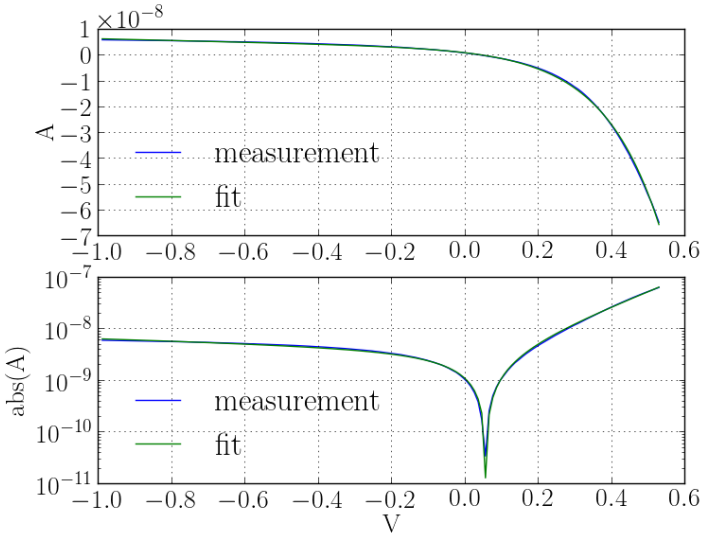
600nm 1553.65nW



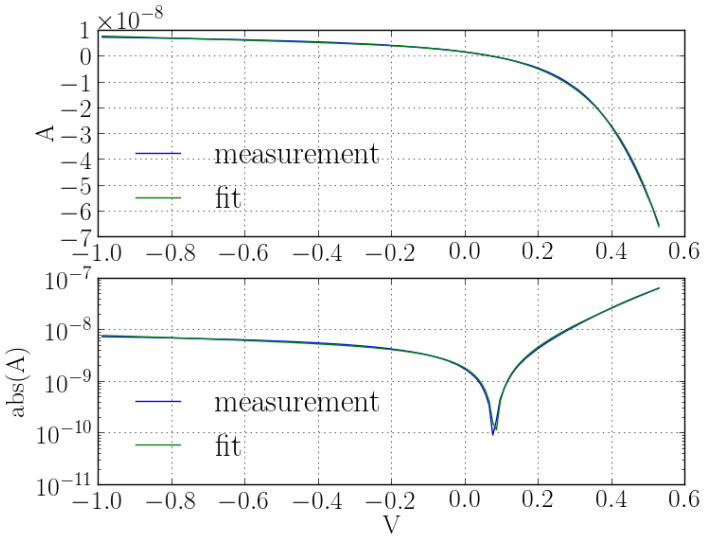
650nm 0nW



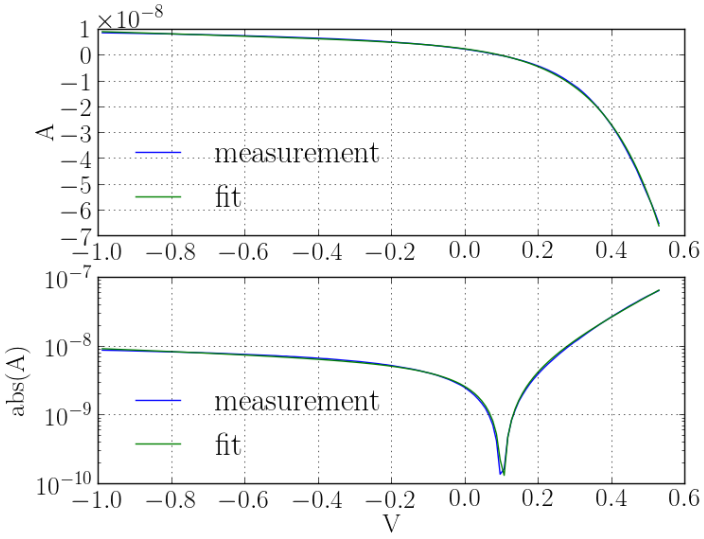
650nm 19.92nW



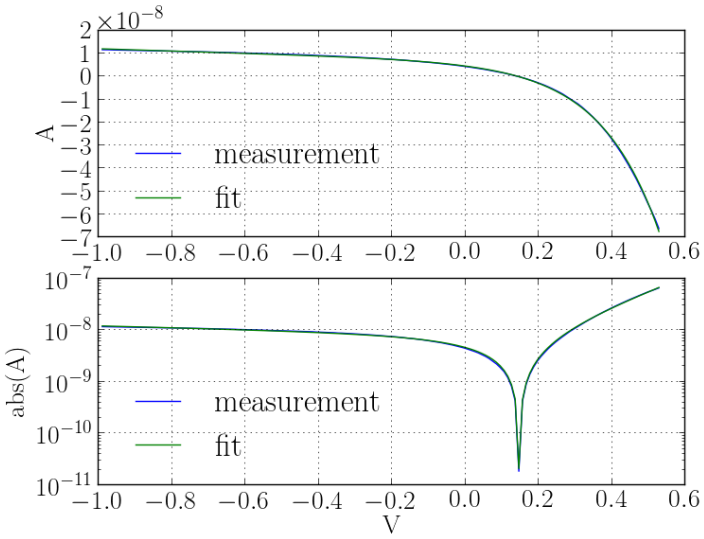
650nm 49.67nW



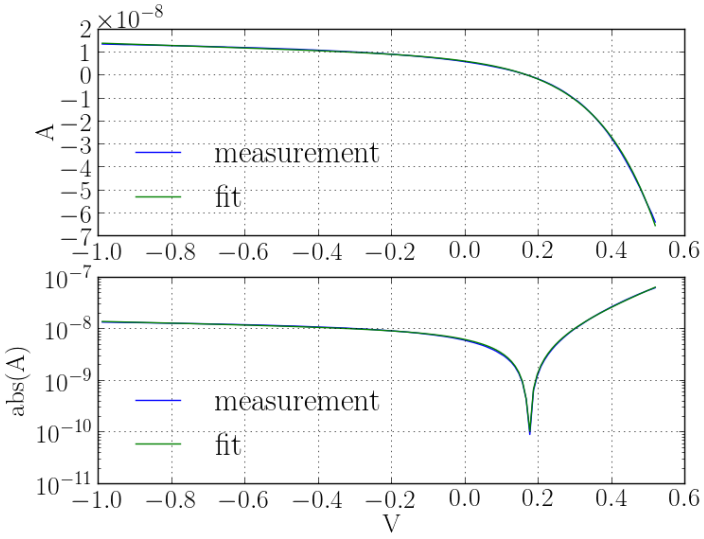
650nm 99.85nW



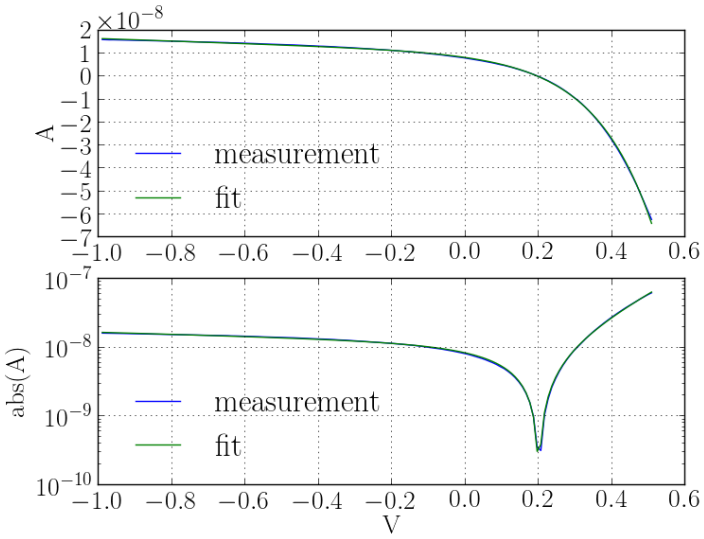
650nm 169.52nW



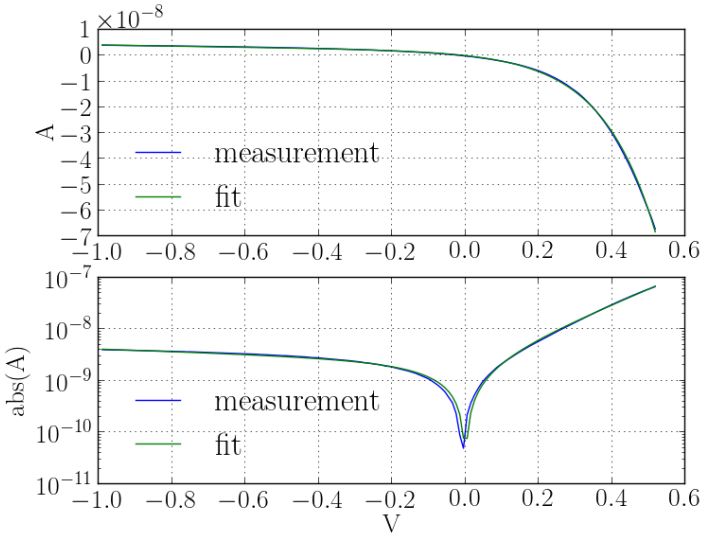
650nm 512.09nW



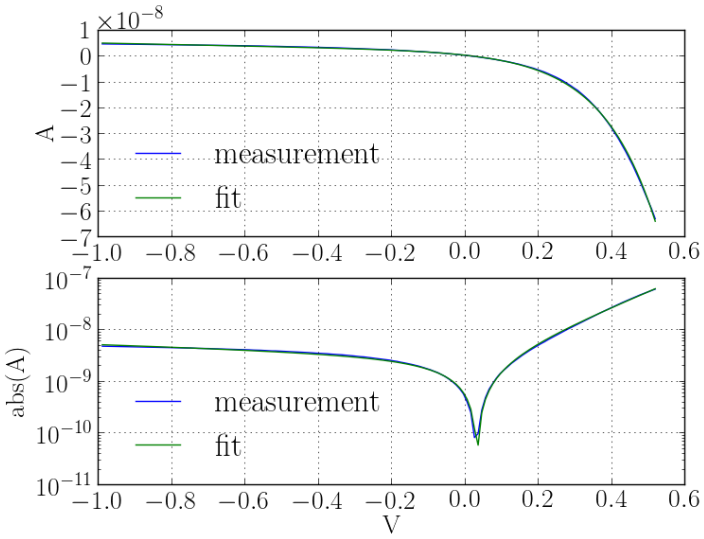
650nm 1013.72nW



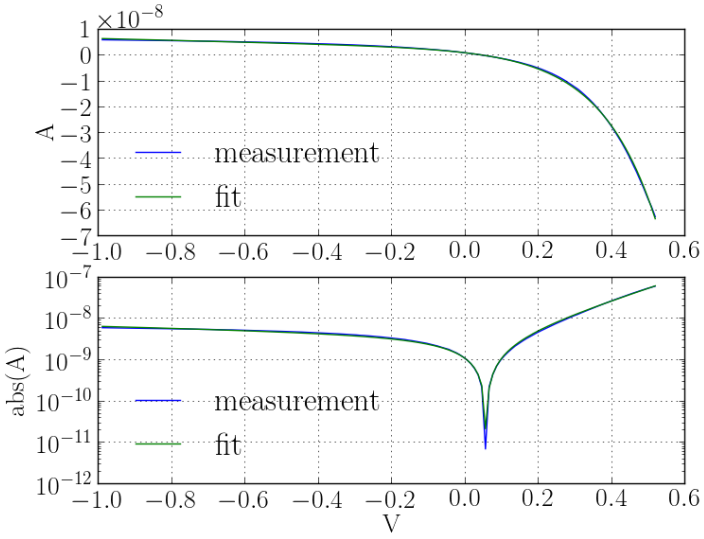
650nm 2019.41nW



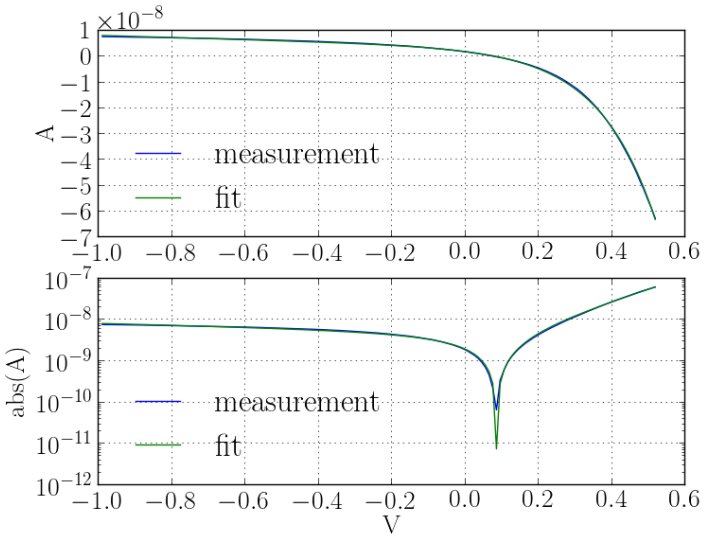
700nm 0nW



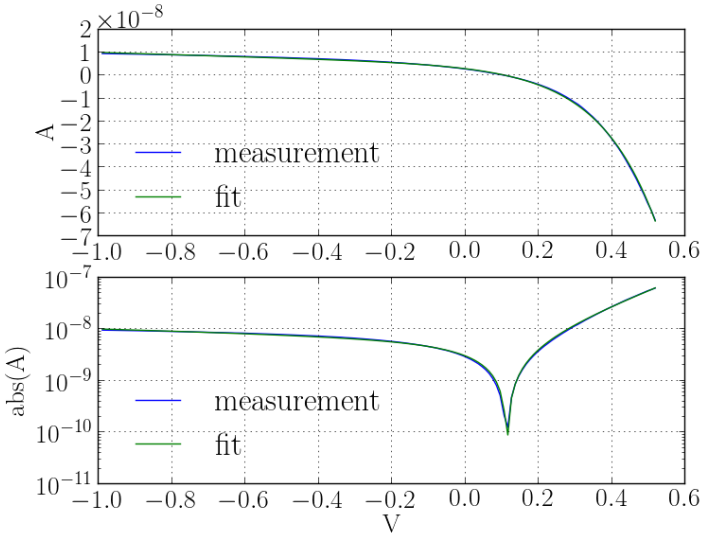
700nm 19.25nW



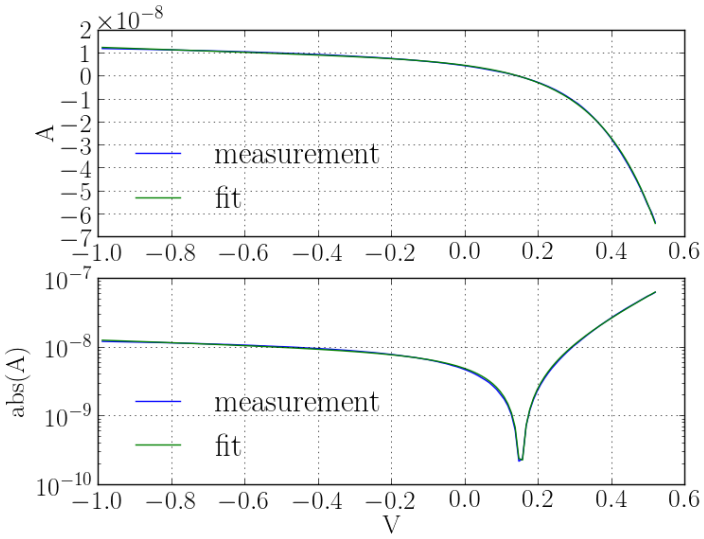
700nm 49.31nW



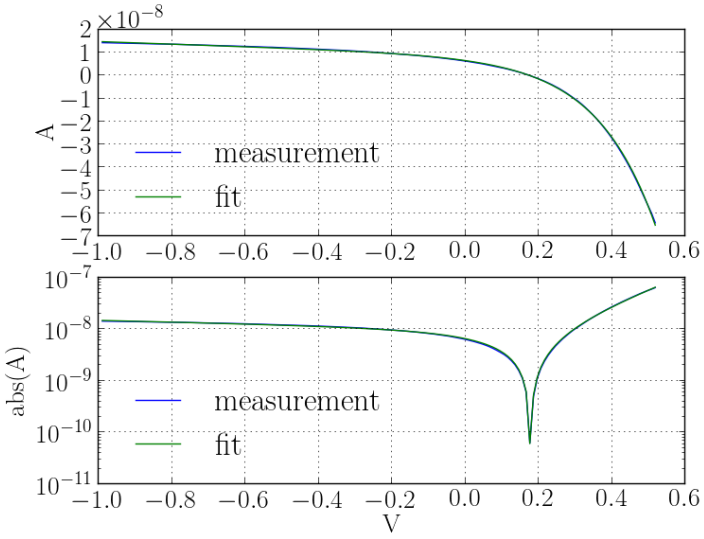
700nm 99.09nW



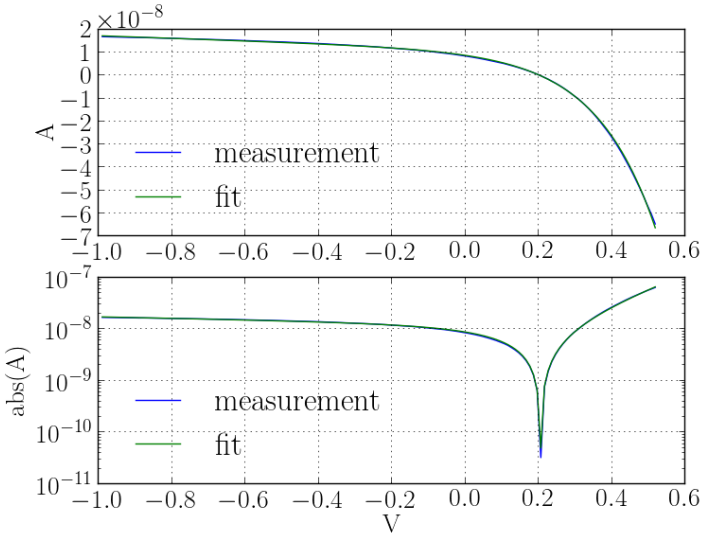
700nm 200.17nW



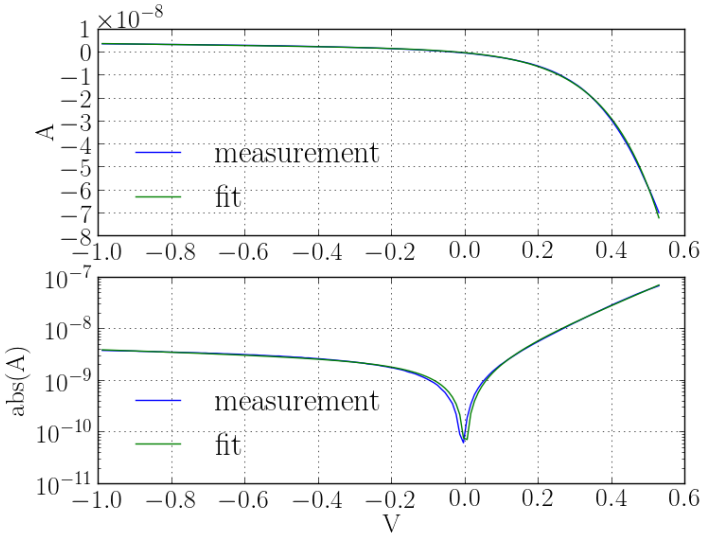
700nm 510.69nW



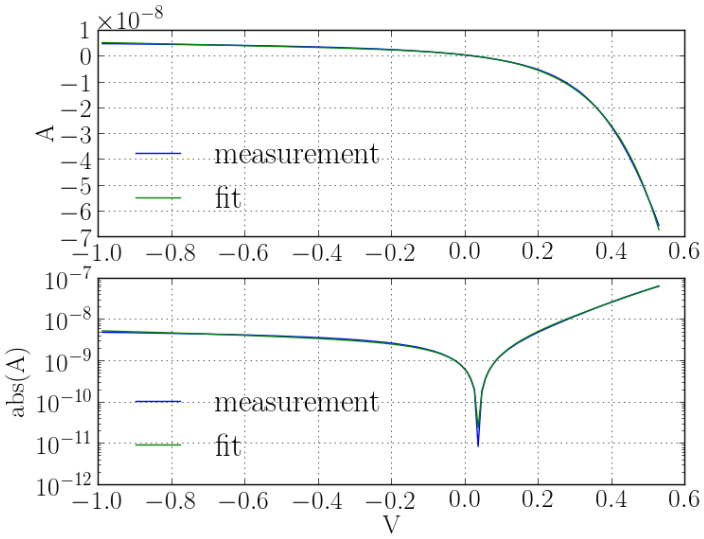
700nm 984.20nW



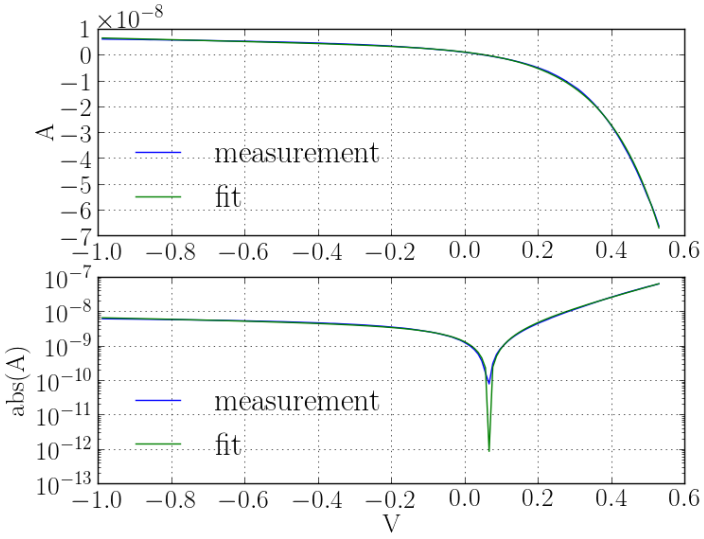
700nm 2030.15nW



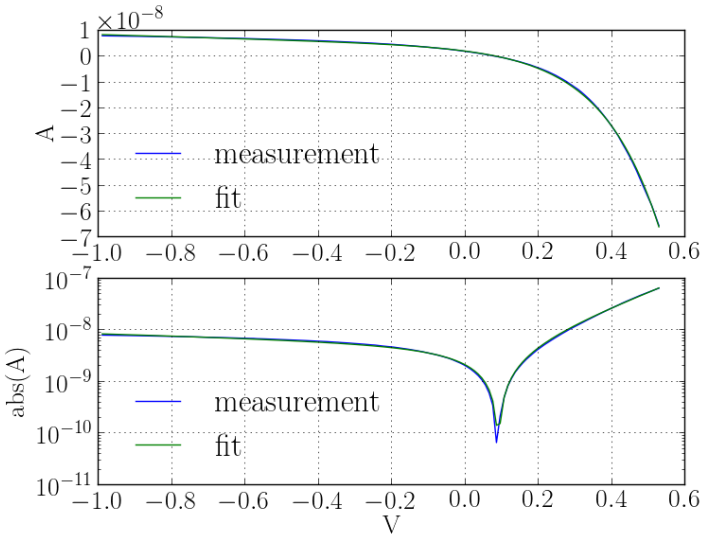
750nm 0nW



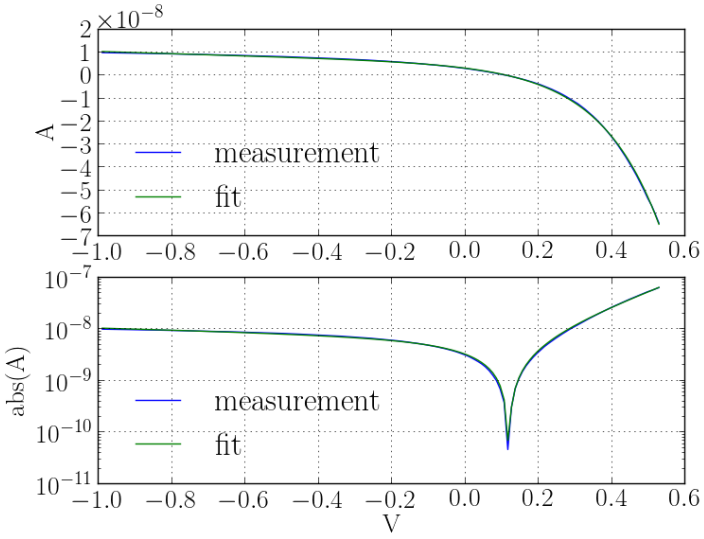
750nm 21.10nW



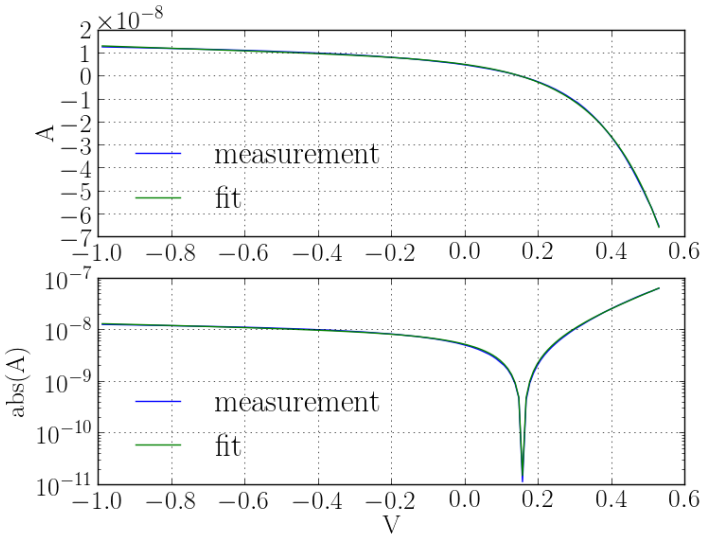
750nm 50.76nW



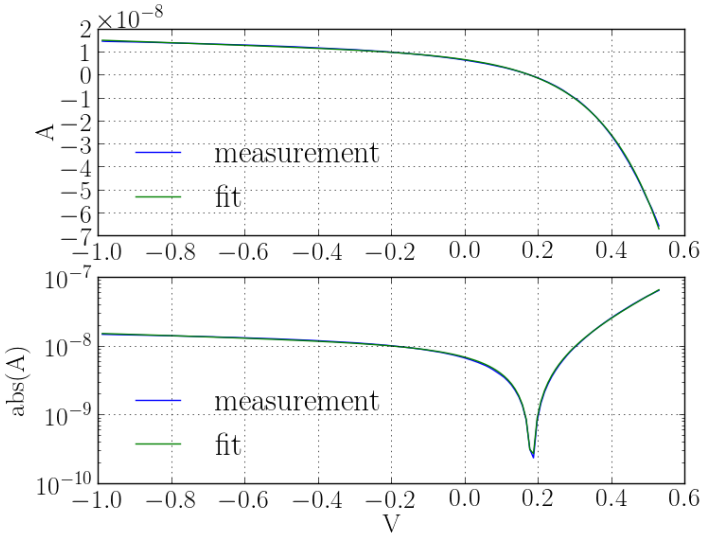
750nm 100.74nW



750nm 203.82nW



750nm 538.48nW



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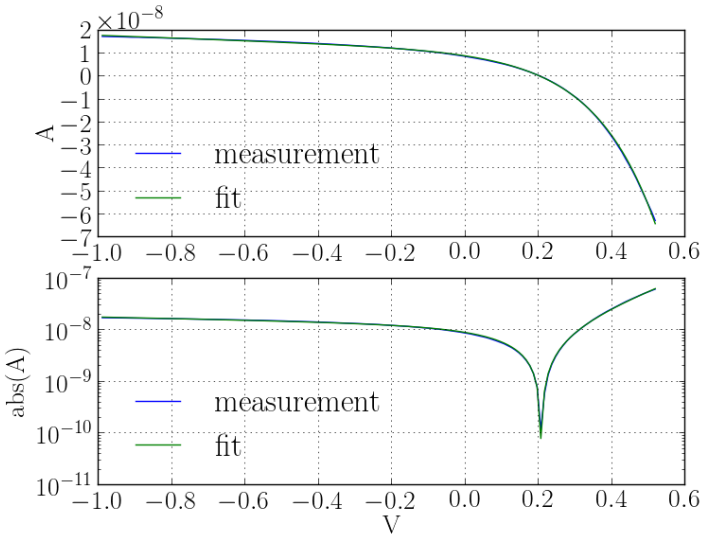
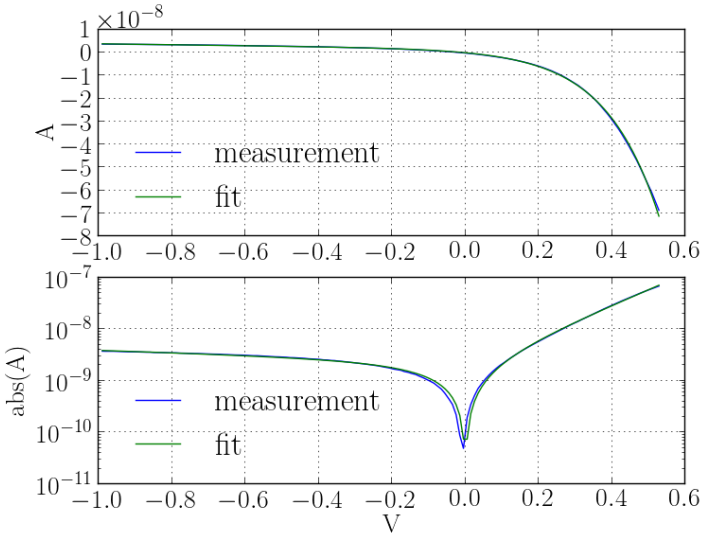
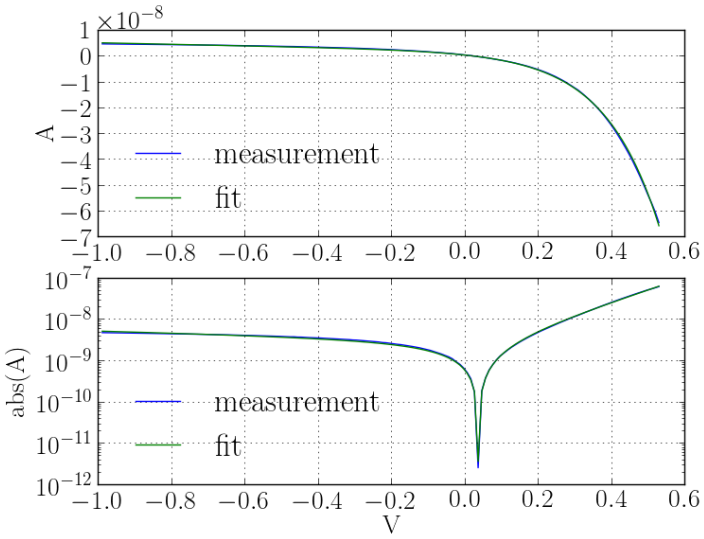


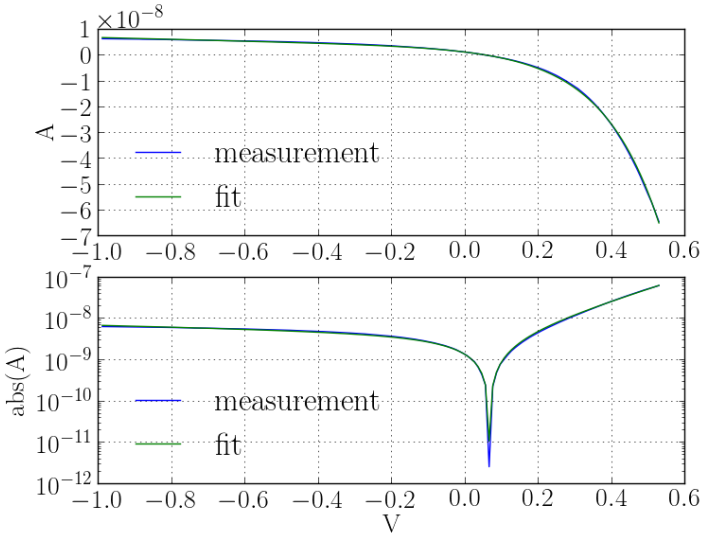
750nm 1955.91nW



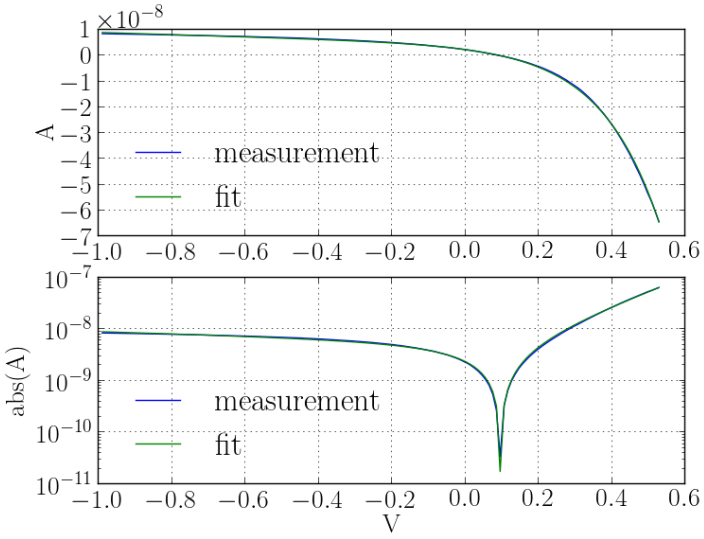
800nm 0nW



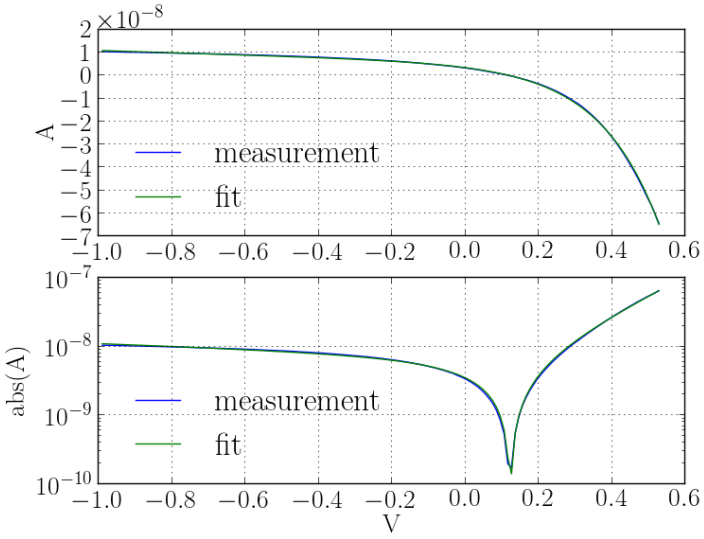
800nm 19.42nW



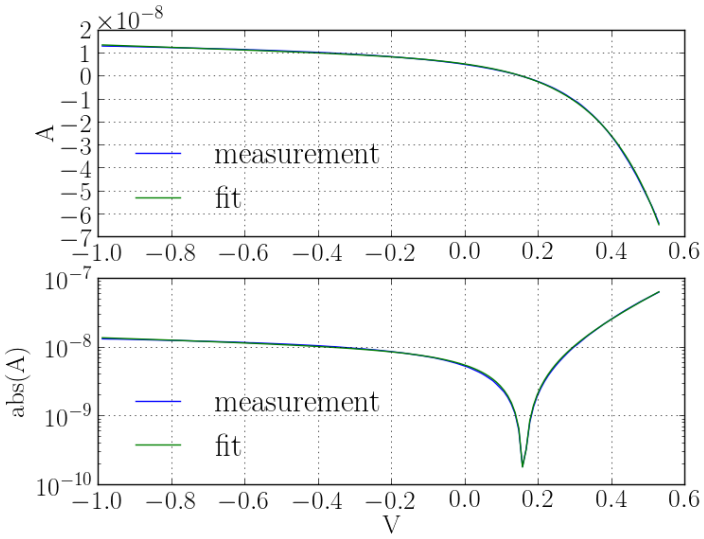
800nm 50.37nW



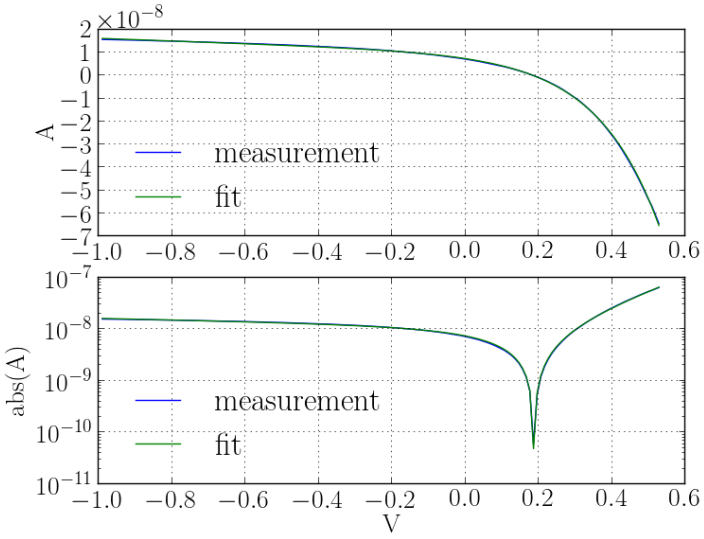
800nm 105.99nW



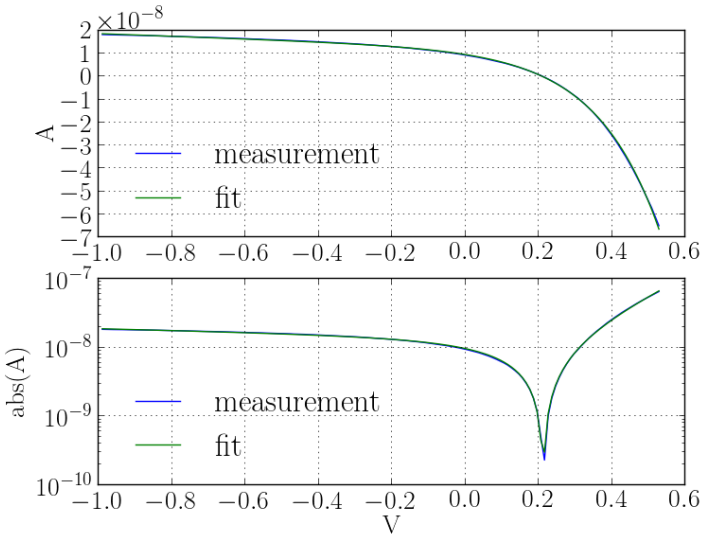
800nm 201.64nW



800nm 516.49nW



800nm 1020.29nW



800nm 1989.84nW

Table of all fit parameters:

λ[nm]	power [nW]	R_s[Ω]	R_s[Ω]	I_p[A]	I_s[A]	n
500	0	1.24E+01	5.03E+08	9.30E-14	1.83E-09	5.6
500	20	1.23E+01	4.98E+08	6.93E-11	1.79E-09	5.7
500	50	1.30E+01	4.62E+08	2.60E-10	1.84E-09	5.7
500	99	1.29E+01	4.97E+08	1.82E-10	1.83E-09	5.8
500	201	1.28E+01	3.40E+08	8.51E-10	1.93E-09	5.8
500	490	1.23E+01	2.06E+08	3.11E-09	2.51E-09	6.2
500	863	1.26E+01	1.89E+08	4.05E-09	2.68E-09	6.3
500	2208	1.19E+01	1.69E+08	6.21E-09	2.94E-09	6.3
550	0	1.27E+01	5.52E+08	5.55E-13	1.81E-09	5.6
550	23	1.36E+01	4.97E+08	2.06E-10	1.79E-09	5.7
550	50	1.36E+01	4.76E+08	6.12E-10	2.08E-09	5.9
550	81	1.38E+01	3.40E+08	9.22E-10	1.92E-09	5.8
550	205	1.26E+01	2.41E+08	2.03E-09	2.28E-09	6.0
550	496	1.31E+01	1.97E+08	3.67E-09	2.59E-09	6.2
550	999	1.32E+01	1.72E+08	5.21E-09	2.78E-09	6.3
550	1999	1.28E+01	1.10E+08	6.75E-09	2.31E-09	6.5
600	0	1.13E+01	3.45E+08	6.79E-14	1.77E-09	5.6
600	20	1.12E+01	3.31E+08	4.02E-10	1.80E-09	5.7
600	50	1.30E+01	2.95E+08	8.50E-10	1.99E-09	5.9
600	96	1.25E+01	2.69E+08	1.41E-09	2.09E-09	5.9
600	204	1.26E+01	2.36E+08	2.42E-09	2.29E-09	6.1
600	495	1.21E+01	2.18E+08	3.97E-09	2.48E-09	6.2
600	992	1.26E+01	2.05E+08	5.55E-09	2.59E-09	6.1
600	1554	1.24E+01	2.00E+08	6.74E-09	2.69E-09	6.1
650	0	1.34E+01	4.59E+08	1.88E-12	2.04E-09	5.8
650	20	1.16E+01	3.34E+08	5.30E-10	1.91E-09	5.8
650	50	1.28E+01	2.97E+08	1.10E-09	2.07E-09	5.9
650	100	1.39E+01	2.53E+08	1.84E-09	2.20E-09	6.0
650	170	1.34E+01	2.28E+08	2.60E-09	2.34E-09	6.0
650	512	1.17E+01	2.02E+08	4.65E-09	2.59E-09	6.1
650	1014	1.24E+01	1.93E+08	6.33E-09	2.70E-09	6.1
650	2019	1.17E+01	1.81E+08	8.36E-09	2.77E-09	6.3
700	0	1.21E+01	4.54E+08	1.59E-12	1.93E-09	5.6
700	19	1.22E+01	3.44E+08	5.40E-10	1.83E-09	5.6
700	49	1.36E+01	2.80E+08	1.10E-09	1.96E-09	5.7
700	99	1.16E+01	2.40E+08	1.96E-09	2.13E-09	5.9
700	200	1.24E+01	2.09E+08	3.06E-09	2.32E-09	6.0
700	511	1.25E+01	1.87E+08	4.93E-09	2.55E-09	6.1
700	984	1.31E+01	1.80E+08	6.59E-09	2.72E-09	6.1

700	2030	1.25E+01	1.78E+08	8.86E-09	2.96E-09	6.2
750	0	1.21E+01	4.70E+08	3.95E-12	1.89E-09	5.6
750	21	1.07E+01	3.34E+08	6.28E-10	1.85E-09	5.7
750	51	1.16E+01	2.90E+08	1.34E-09	2.08E-09	5.8
750	101	1.27E+01	2.39E+08	2.14E-09	2.24E-09	6.0
750	204	1.23E+01	2.09E+08	3.29E-09	2.50E-09	6.2
750	538	1.27E+01	1.88E+08	5.33E-09	2.82E-09	6.3
750	1005	1.28E+01	1.79E+08	6.97E-09	2.95E-09	6.3
750	1956	1.24E+01	1.70E+08	9.08E-09	3.09E-09	6.4
800	0	1.33E+01	4.87E+08	1.16E-12	1.85E-09	5.6
800	19	1.18E+01	3.35E+08	5.92E-10	1.79E-09	5.7
800	50	1.29E+01	2.86E+08	1.37E-09	2.15E-09	6.0
800	106	1.15E+01	2.34E+08	2.37E-09	2.35E-09	6.1
800	202	1.30E+01	2.01E+08	3.51E-09	2.53E-09	6.2
800	516	1.43E+01	1.81E+08	5.53E-09	2.85E-09	6.4
800	1020	1.26E+01	1.74E+08	7.44E-09	3.10E-09	6.5
800	1990	1.33E+01	1.74E+08	9.66E-09	3.37E-09	6.5