APPENDIX Sample output from Excel second order regression analysis

Second Order Regression
SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.999999115
R Square	0.99999823
Adjusted R Square	0.99999469
Standard Error	0.009450659
Observations	4

This is the standard error of the fit to the equation emf = $\alpha_0 + \alpha_1 T + \alpha_2 T^2$. You will often use this value to add error bars (or in this expt to calculate the position of the second curve in Plot 4 where you subtract $2S_{fit}$ from the experimental data curve – this value is the S_{fit} value).

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	2	50.4609338	25.230467	282488.6889	0.0013304
Residual	1	8.9315E-05	8.931E-05		
Total	3	50.4610231			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.013841216	0.00669069	2.0687271	0.286651263	-0.071172	0.0988542	-0.071172	0.0988542
T (deg C)	0.036909275	6.334E-05	582.7166	0.001092502	0.0361045	0.0377141	0.0361045	0.0377141
T^2	4.44095E-05	4.6514E-07	95.474501	0.006667712	3.85E-05	5.032E-05	3.85E-05	5.032E-05

Calibration coefficients for your second order regression analysis – in this case the α values from the equation : emf = $\alpha_0 + \alpha_1 T + \alpha_2 T^2$

The *Standard Error* column gives you the uncertainties in your α values. For instance here we would report α values of :

$\alpha_0 = 0.014(7)$
$\alpha_1 = 0.03691(6)$
$\alpha_2 = 4.44(5)$

Be sure to present your final values and uncertainties to the correct number of significant figures. For instance saying $\alpha_0 = 0.013841216(0.00669069)$ or $\alpha_0 = 0.013841216 \pm 0.007$ are incorrect since you are not taking into consideration the numbers of significant figures.