Support Information

Bulk Synthesis of Conductive Non-Metallic Carbon Nanospheres and a 3D Printed Carrier Device for Scanning Electron Microscope Calibration

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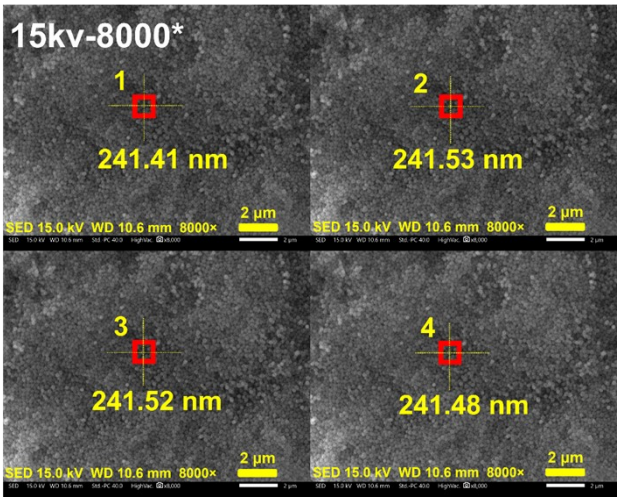

Fig. S1. Four SEM images of conductive carbon nanospheres at an accelerating voltage of 15 kV and a magnification of 8000

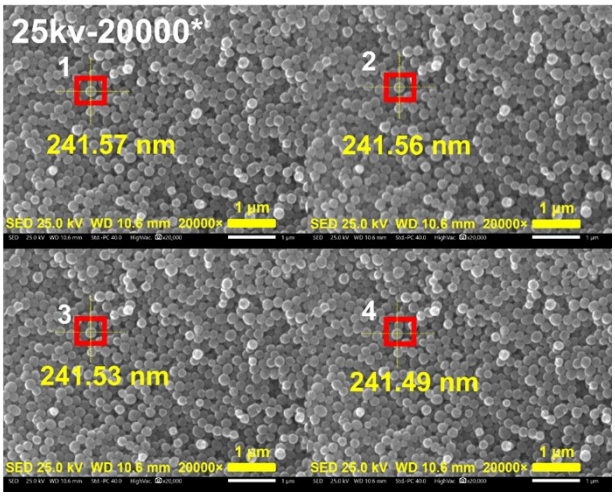

Fig. S2. Four SEM images of conductive carbon nanospheres at an accelerating voltage of 25 kV and a magnification of 20000

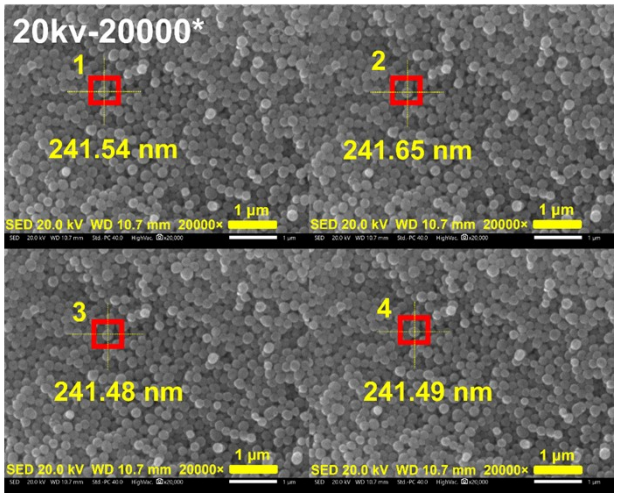

Fig. S3. Four SEM images of conductive carbon nanospheres at an accelerating voltage of 20 kV and a magnification of 20000

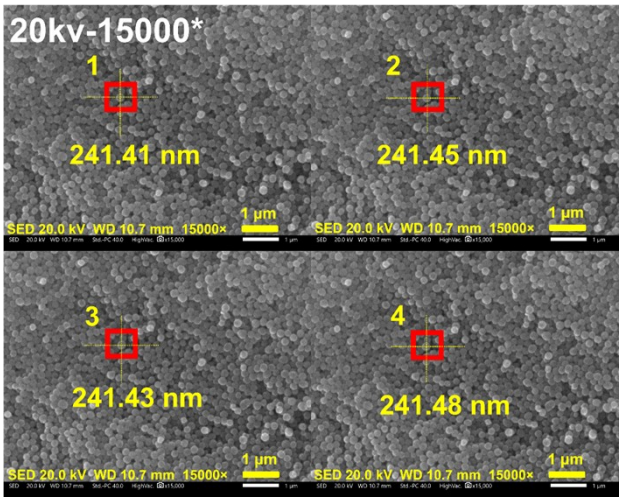

Fig.S4. Four SEM images of conductive carbon nanospheres at an accelerating voltage of 20 kV and a magnification of 15000

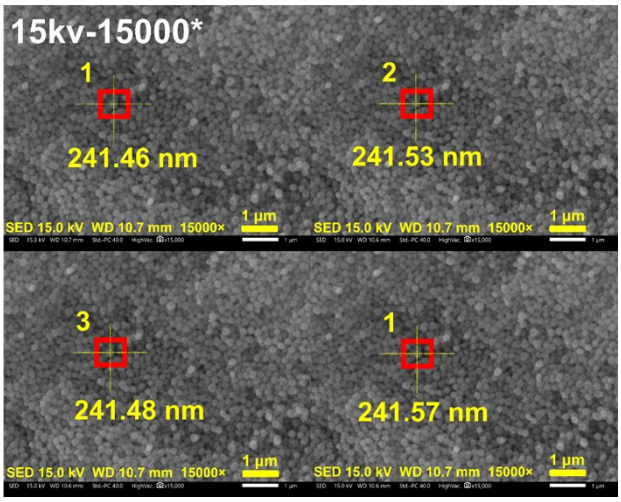

Fig. S5. Four SEM images of conductive carbon nanospheres at an accelerating voltage of 15 kV and a magnification of 15000

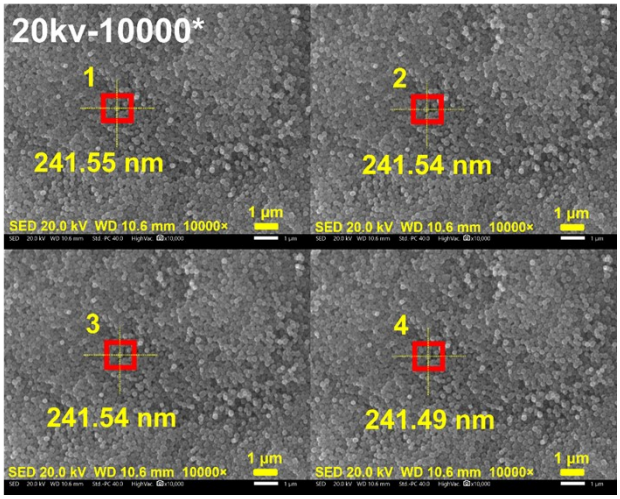

Fig. S6. Four SEM images of conductive carbon nanospheres at an accelerating voltage of 20 kV and a magnification of 10000

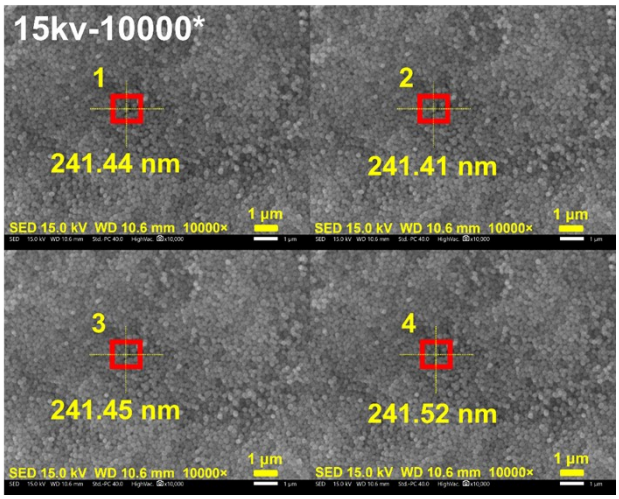

Fig. S7. Four SEM images of conductive carbon nanospheres at an accelerating voltage of 15 kV and a magnification of 10000

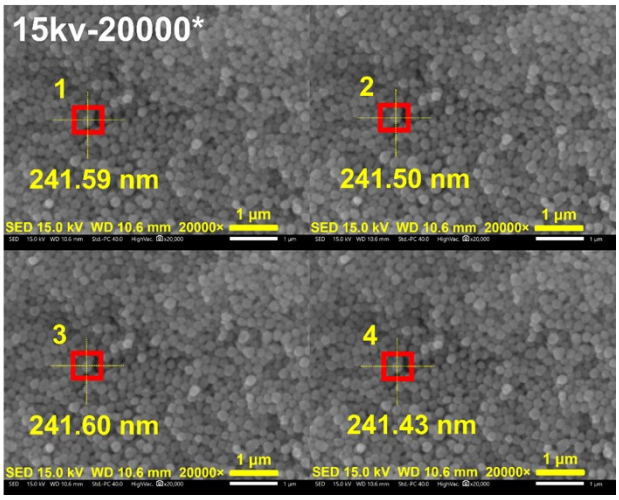

Fig.S8. Four SEM images of conductive carbon nanospheres at an accelerating voltage of 15 kV and a magnification of 20000

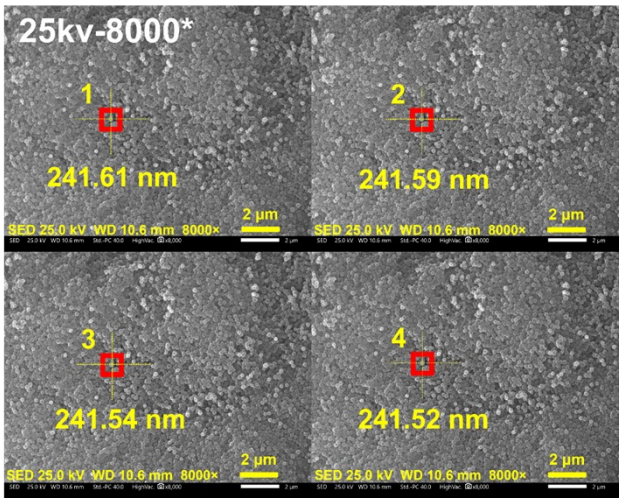

Fig. S9. Four SEM images of conductive carbon nanospheres at an accelerating voltage of 25 kV and a magnification of 8000

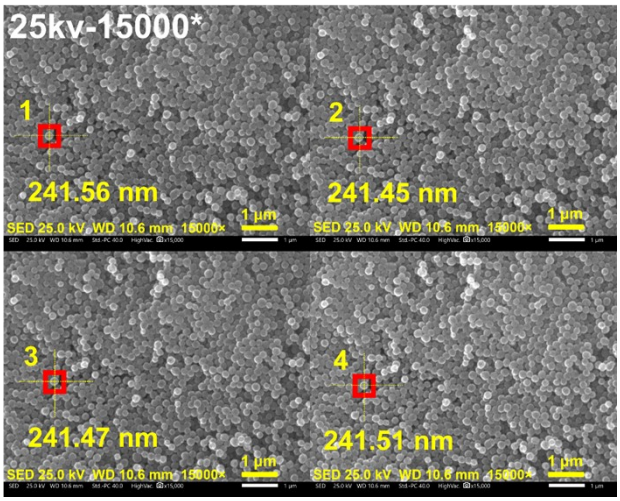

Fig. S10. Four SEM images of conductive carbon nanospheres at an accelerating voltage of 25 kV and a magnification of 15000

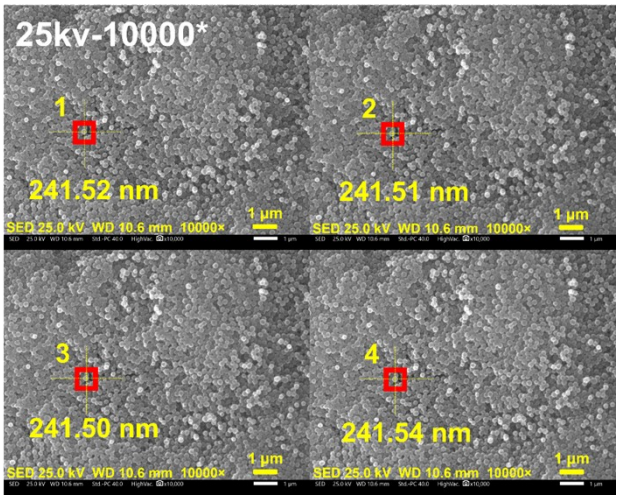

Fig. S11. Four SEM images of conductive carbon nanospheres at an accelerating voltage of 25 kV and a magnification of 10000

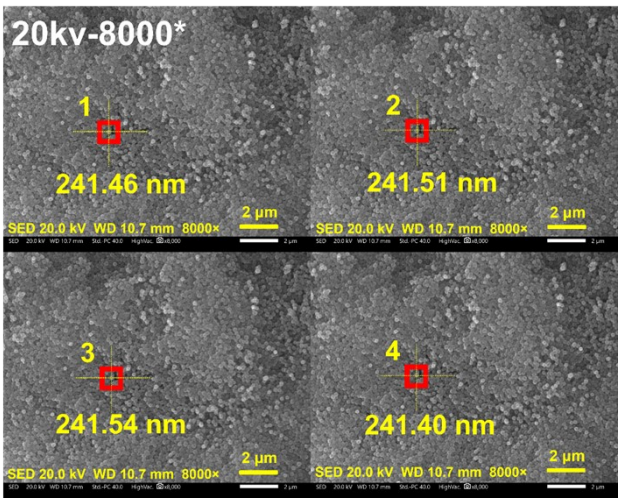

Fig. S12. Four SEM images of conductive carbon nano-spheres at an accelerating voltage of 20 kV and a magnification of 8000

Table S1. Normality test by Shapiro-Wilk test for two-way ANOVA data

Variable	Level	Statistic	df	p value
Voltage (kV)	15	0.952	16	0.523
	20	0.944	16	0.405
	25	0.991	16	0.999
Enlargement factor	8000	0.949	12	0.616
	10000	0.885	12	0.102
	15000	0.947	12	0.592
	20000	0.982	12	0.991

Table S2. Levene's test of equality of error variances for two-way ANOVA data [a,b]

Dependent variable		Statistic	df1	df2	p value
Microsphere diameter	Based on Mean	1.536	11	36	0.161
	Based on Median	1.236	11	36	0.300
	Based on Median and with adjusted df	1.236	11	19.248	0.329
	Based on trimmed mean	1.528	11	36	0.164

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Dependent variable: measured diameter

b. Design: Intercept + Accelerating voltage + Magnification + Voltage * Enlargement factor

Table S3 Two-way ANOVA for measured diameters (independent variables: accelerating voltage and magnification)

Source	SS	df	MS	p value
Accelerating voltage	0.012	2	0.006	0.119
Magnification	0.017	3	0.006	0.104
Accelerating voltage * Magnification	0.031	6	0.005	0.098
Error	0.094	36	0.003	
Total	2799637.206	48		

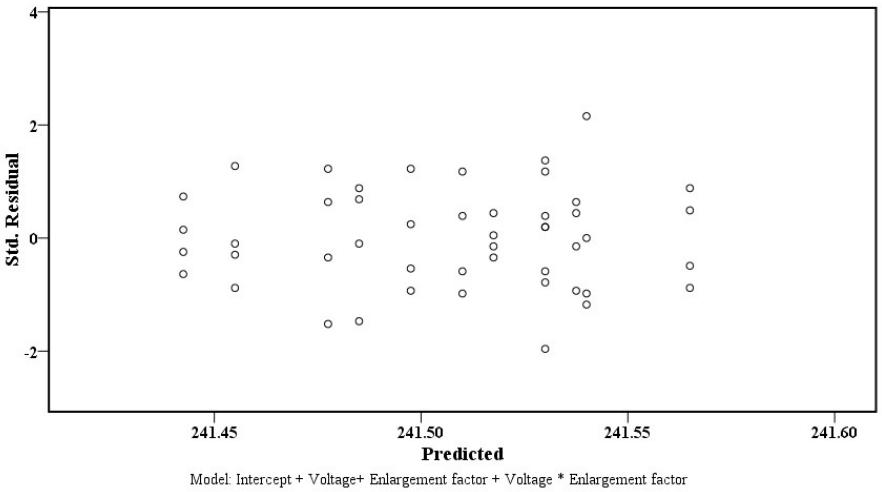

Fig.S13. Residual plot of two-way ANOVA (standardized residuals against predicted)

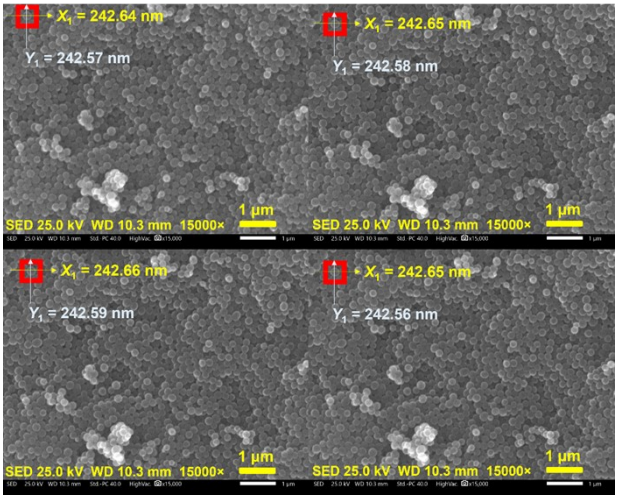

Fig. S14. Four SEM images of conductive carbon nanospheres at an accelerating voltage of 25 kV

and a magnification of 15000 (Upper left corner)

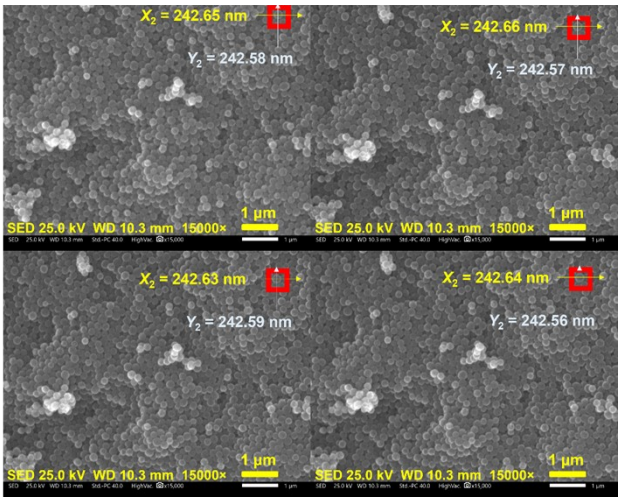

Fig. S15. Four SEM images of conductive carbon nanospheres at an accelerating voltage of 25 kV and a magnification of 15000 (Upper right corner)

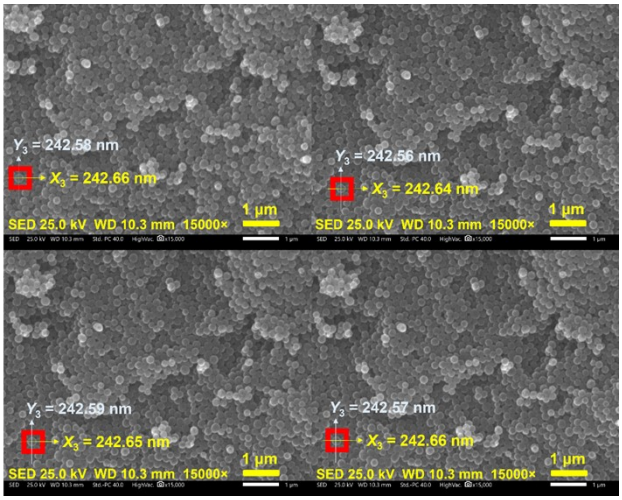

Fig. S16. Four SEM images of conductive carbon nanospheres at an accelerating voltage of 25 kV and a magnification of 15000 (Bottom left corner)

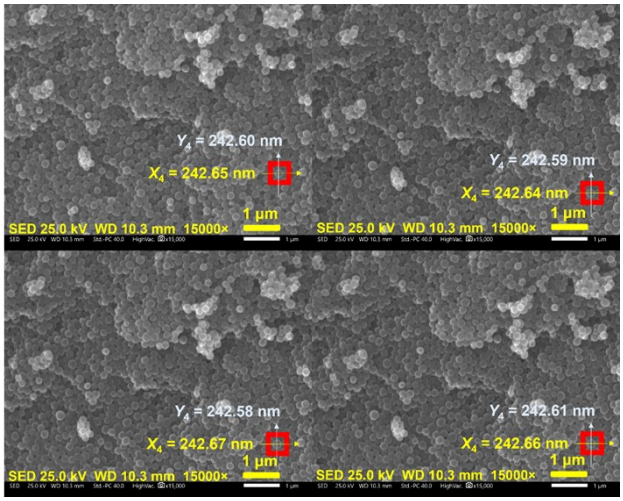

Fig. S17. Four SEM images of conductive carbon nanospheres at an accelerating voltage of 25 kV

and a magnification of 15000 (Bottom right corner)

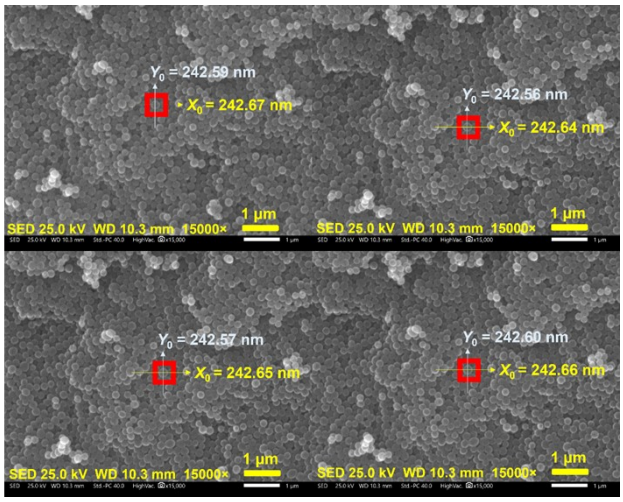

Fig. S18. Four SEM images of conductive carbon nanospheres at an accelerating voltage of 25 kV and a magnification of 15000 (Central Area)

Table S4. Normality test by Shapiro-Wilk test for one-way ANOVA data of X-axis direction and Y-axis direction.

Position	X-axis direction			Y-axis direction		
	Statistic	df	P value	Statistic	df	P value
Center	0.895	4	0.406	0.950	4	0.714
Top left	0.945	4	0.683	0.993	4	0.972
Top right	0.993	4	0.972	0.993	4	0.972
Bottom left	0.863	4	0.272	0.993	4	0.972
Bottom left	0.993	4	0.972	0.993	4	0.972

Table S5. Levene's test of equality of error variances for one-way ANOVA data of X-axis direction and Y-axis direction. [a]

Dependent variable		Statistic	df1	df2	p value
Microsphere diameters measured in X-axis direction	Based on Mean	0.506	4	15	0.732
	Based on Median	0.404	4	15	0.803
	Based on Median and with adjusted df	0.404	4	11.393	0.802
	Based on trimmed mean	0.493	4	15	0.471

Microsphere diameters measured in Y-axis direction	Based on Mean	0.600	4	15	0.668
	Based on Median	0.600	4	15	0.668
	Based on Median and with adjusted df	0.600	4	15.000	0.668
	Based on trimmed mean	0.600	4	15	0.668

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + Position

Table S6. One-way ANOVA of photographing positions for measured diameters in the X-axis direction and the Y-axis direction

Source	SS	df	MS	p value
Position (X-axis direction)	0.000	4	0.0000575	0.776
Error (X-axis direction)	0.002	15	0.000	
Total (X-axis direction)	1177590.158	20		
Position (Y-axis direction)	0.001	4	0.000	0.252
Error (Y-axis direction)	0.003	15	0.000	
Total (Y-axis direction)	1176901.132	20		

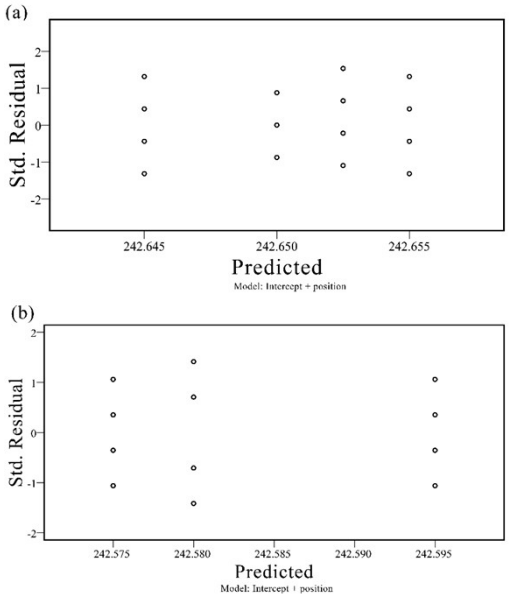

Fig.S19. Residual plots of one-way ANOVA, (a) measured diameters measured in X-axis direction, (b) measured diameters measured in Y-axis direction (standardized residuals against

predicted).