Modeling the Relationship between the Impressions and Image Features of Crinkle Finish of DSLR Camera

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Abstract. *In this article, the authors study the relationships between the principal impressions of crinkle-finished surfaces, which are found on camera exteriors, and the characteristics of test images of crinkle-finished surfaces. They extracted impression words for the surfaces through subjective experiments with humans. The results suggest that the impression is affected by five factors: two physical impression factors and three emotional impression factors. The surface images were obtained using a multi-angle measurement system that was built to collect images under various conditions. The authors used stepwise multiple regression to derive equations to predict the impressions of the surface given the characteristics of its test images. The results of the equations are highly correlated with the subjective scores of the five impression factors. These models will enable designers to design attractive crinkle-finished surfaces and camera exteriors.* Ⓒ *2020 Society for Imaging Science and Technology.*
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1. INTRODUCTION

Appearance is an important factor that affects the motivation of buyers of industrial products for consumers. Surface finish painting and fabrication methods to alter a product's appearance have been developed for many years. In digital single-lens reflex (DSLR) cameras, the impression of a premium feeling is a key factor. Therefore, manufacturers have developed painting methods to generate this impression.

One painting method used to provide the feeling of premium quality on camera exteriors is crinkle finish. Figure 1 shows an example of a crinkle-finished surface, where dark particles are splashed onto a black base surface. These surfaces are mainly used for the exterior of DSLR and parts of automobiles; for example, head covers of engines. Designers determine the qualities of a crinkle finish to increase affective value. However, these qualities may result in unintended or even negative affective value because the crinkle finishes are determined by a designer's subjective impressions, which may not correspond to those of the customer. To avoid such problems, it is important to clarify the principal impressions of a crinkle finish and construct a model to relate those impressions with surface features. This

would make it possible to design a crinkle-finished surface for providing the intended impression.

Kansei engineering is a philosophy and method for product design, which considers what consumers feel from products and not only functions [10, 16, 20]. Regarding the relationships between impressions and shape design of products, some previous studies have analyzed car front grill design [7], PET container design of bottled beverages [1], cosmetic box design [12], and glass design [2]. With respect to the relationships between impressions and surface features, some previous studies have also analyzed spectral spatial features of pearl surfaces [14, 17, 19], exterior colors of cellular phones [9], image features of wood floor materials [13], and physical properties of woven fabrics [15]. In contrast, there exist no studies that extract and model the principal impressions for exterior paint on DSLRs.

The purpose of this study is two-fold: (1) to determine the factors that influence the visual impressions of a crinkle finish and (2) to model the relationships between these factors and image characteristics. These relationships can help designers to provide better impressions to users of DSLRs.

Hence, we conducted experiments to evaluate the impression of crinkle-finished samples and measured the features of images of the surfaces.

Previously, we had reported the results of impression evaluation and modeling the relationships between a selected list of the impressions and image characteristics [3]. In this article, we report the results of impression evaluation and modeling the relationships between all extracted impressions through these experiments and image characteristics of surfaces.

2. EXPERIMENT 1

Impression evaluation experiments are psychological tests that clarify and quantify principal impressions of samples [18]. There is no standard dataset of words used to evaluate product impression for consumer electronic devices. Therefore, we had to create our own dataset. To determine the proper evaluation words, we conducted three experiments before the impression evaluation experiment: an impression-word extraction test, an impression-word appro-

Figure 1. Exterior of a digital single-lens reflex camera and magnified image of a crinkle-finished surface.

priateness test, and a rating word distance measurement test. Through an impression-word extraction test, we gathered impressions of crinkle-finished surfaces widely. However, these widely gathered words contain uncommon or personal impressions. Therefore, we extracted users' common expressions by an impression-word appropriateness test. Then we conducted a rating word distance test to group similar impressions.

2.1 Methods

2.1.1 Impression-Word Extraction Test

First, we extracted general impressions about crinkle finishes. Fourteen subjects observed three crinkle-finished samples and two general DSLRs and then wrote down impressions they felt with single words or short phrases as many as they could. They were encouraged to clamp samples and view them at various angles. They could write down only visual impressions, not haptic impressions. The subjects were encouraged to observe a small flat area (about 15 mm × 20 mm) to avoid the effects of sample and camera shapes. The subjects were image science engineers in our company and consisted of 13 men and 1 woman in their 20s to 50s. They were selected randomly without any consideration of their knowledge of DSLR. They were told that samples were parts of DSLR exteriors.

This test was conducted using a standard light source (Spectra Light QC; X-Rite, MA, USA). Standard illuminant D65 was used, and the illuminance of the observation area was set at 1,300 lx. These conditions were also used for the appropriateness tests and impression evaluation experiments.

After all participants wrote down impressions, we took all words that had appeared at least once. Then, 114 words were extracted from this experiment. Additionally, we added 25 words used by paint designers. A total of 139 words were extracted to describe the general impressions of crinkle finish.

2.1.2 Impression-Word Appropriateness Test

The words gathered by the impression-word extraction test contain complex and uncommon words. These words are not appropriate for use in evaluation experiments. Therefore,

in this test, we evaluated appropriateness of these words for crinkle paint impression evaluation.

In this test, 21 participants evaluated the appropriateness of 139 words using seven scores from 1 ("very inappropriate") to 7 ("very appropriate"). Subjects observed three crinkle-finished samples and two general DSLRs and then evaluated how appropriate each word was for the impression of samples. In this test, subjects could also clamp samples and observe them at various angles. Subjects were encouraged to observe a small flat area to avoid the effects of sample and camera shapes. Ten participants were instructed to evaluate how appropriate each word was for the impression of physical condition and 11 participants were instructed to evaluate how appropriate each word was for the impression of what they feel from samples. Because the number of evaluation words must be smaller than the number of samples to perform factor analyses, the number of evaluated impressions is limited. Therefore, we analyzed physical impressions and emotional impressions separately to evaluate more impressions [5, 6, 11, 21]. We call the former "low-level impressions" and the latter "high-level impressions." We calculated the average and standard deviation of each sample score. Words with an average score of more than five and a standard deviation of less than 1.5 were selected as appropriate words.

We extracted 36 words appropriate for low-level impressions and 32 words appropriate for high-level impressions. Eighteen words were appropriate for both levels of impression.

As mentioned in Section 1, the crinkle finish is intended to provide a premium feeling. However, no words related to 'feels premium' were extracted by the impression-word appropriateness test. Hence, we added "feels premium" to the high-level impression appropriate words to investigate the relationship between the premium feeling and other impressions.

2.1.3 Rating Word Distance Measurement Test

We conducted a rating word distance measurement test to measure the distances of the meanings between impression words.

Table I. Evaluation words.

Low-level impressions		High-level impressions	
smooth	granular	slick	fine
fine	rough	stately	nonuniform
nonuniform	glittering	clear	bumpy
cloudy	lumpy	lumpy	simple
matte		sparkling	feels premium

Table II. Crinkle-finish sample types.

Coating material TYPE-A			
		Quantity of particles	
		Large	Medium	Small
Size of particles	Large	A1	A2	A3
	Medium	A4		
	Small	A5		
Coating material TYPE-B			
		Quantity of particles	
		Large	Medium	Small
Size of particles	Large	B1	B2	B3
	Medium	B4		
	Small	B5		

Participants were handed the list of all pairs of words extracted in the previous experiment and judged whether each pair of words could be exchanged semantically. This experiment was conducted without the observation of samples. Ten participants evaluated pairs of low-level impression words. They had also evaluated appropriateness of low-level impression at the impression-word appropriateness test. Twelve participants evaluated pairs of high-level impression words. Among 12 participants, 11 participants had also evaluated appropriateness of high-level impression at the impression-word appropriateness test and 1 was a new participant. The new participant was shown crinkle-finished samples before this experiment.

Then, the word distances between each pair were calculated by the following equation:

$$D = \frac{N_n}{N_{all}}. \qquad (1)$$

Here, D is the word distance between a pair of words, N_{all} is the number of all participants, and N_n is the number of participants who judged that the pair of words could not be exchanged semantically. When all participants answer that a pair of words cannot be exchanged, $D = 1$. When all participants answer that a pair of words can be exchanged, $D = 0$. Therefore, D corresponds to normalized similarity between a pair of appropriate words. A pair with a short distance indicates a similar impression and a pair with a long distance indicates different impressions.

We plotted the words in multi-dimensional space using multi-dimensional scaling. The maximum number of dimensions of the space is one less than the number of appropriate words. To analyze the similarities between appropriate words correctly, low- and high-level impression words were plotted in 35- and 31-dimensional spaces, respectively.

To group impression words according to the similarity of impressions, hierarchical cluster analysis was conducted using Ward's method. The high- and low-level impression words were divided into nine clusters, each corresponding to one type of impression. The nine impression words that were the nearest to the center of mass of each cluster were selected as the final evaluation words (Table I).

2.1.4 Impression Evaluation Experiment

Figure 2 shows an example of the crinkle paint samples used in the impression evaluation experiments. The samples

are parts of camera exteriors that were finished using crinkle paints. Table II shows the quantity and size of the paint particles used for the 10 crinkle-finished samples. Three levels of each factor were tested. The sizes of large particles are approximately 0.08 mm^2, medium particles are 0.06 mm^2, and small particles are 0.05 mm^2. Furthermore, we used two particle coating materials (TYPE-A and TYPE-B). The base coating material is the same for all samples. Figure 3 shows some examples of pictures of sample surfaces.

Participants were presented each sample separately and evaluated how strong they felt each impression, which is extracted by a rating word distance measurement test from crinkle-finished samples on a five-level scale from "not felt at all" to "strongly felt." They were encouraged to clamp samples and view them at various angles. They were encouraged to evaluate only visual impressions, not haptic impressions. The samples were shown in random order. Eleven participants evaluated low-level impressions. Among 11 participants, 10 participants had also evaluated low-level impressions in previous experiments and 1 was a new participant. Ten participants evaluated high-level impressions. They had also evaluated high-level impressions in previous experiments.

2.2 Results

To extract the principal impressions, the average subjective scores were calculated and factor analyses of the low- and high-level impressions were performed. The maximum-likelihood method was used to extract low-level impressions. The least-squares method was used to extract high-level impressions because factor analysis did not converge using the maximum-likelihood method. Promax rotation was used for both analyses. Table III shows the factor loadings of the evaluation words for low-level impressions. The cumulative contribution ratio up to the second factor is 76.07%.

The results reveal two factors for low-level impressions. The first consists of the words "lumpy," "rough," "granular," "glittering," and "smooth." The second consists of the words "matte," "cloudy," and "fine."
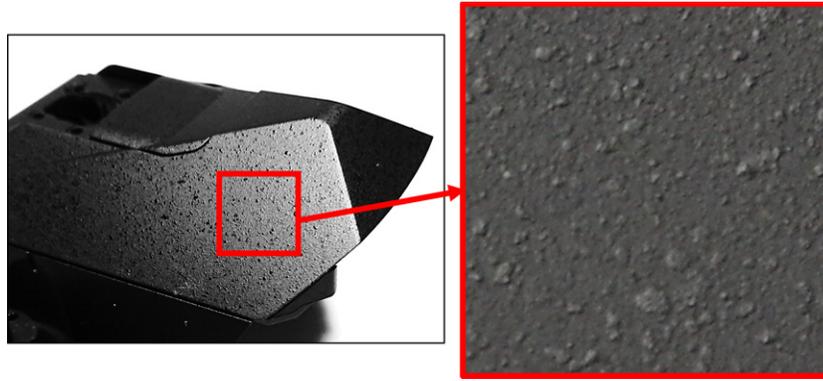
Figure 2. Example of crinkle paint (left) and magnified image of the crinkle-finished surface (right).

We define the first factor as "macroroughness" because it corresponds to a large-scale impression regarding the
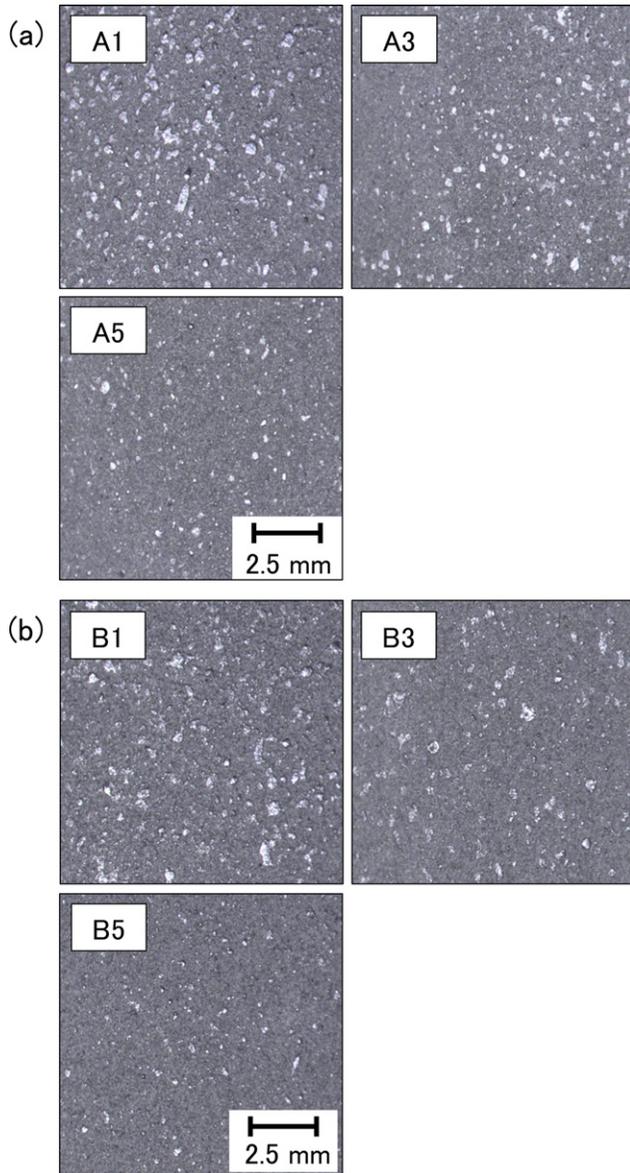

Figure 3. Examples of pictures of sample surfaces: (a) samples painted with TYPE-A; (b) samples painted with TYPE-B.

Table III. Results of factor analysis for low-level impressions.

	Factor 1	Factor 2		
lumpy	1.010	0.049		
rough	0.932	−0.023		
granular	0.849	0.234	⇒	macro roughness
glittering	0.751	0.015		
smooth	−0.978	0.042		
nonuniform	0.429	−0.401		
matte	0.073	1.022		
cloudy	0.203	0.855	⇒	micro roughness
fine	−0.458	0.547		

particles of the crinkle finishes. The second factor is defined as "microroughness" because it corresponds to a smaller-scale impression.

Subjective scores of low-level impressions were calculated by factor analysis. Figure 4 shows the subjective scores of low-level impressions for each sample. This result indicates that macroroughness becomes higher as the quantity of particles becomes larger. Microroughness becomes higher as the size of the particles becomes smaller. The type of paint does not relate to these two impressions.

Table IV shows the factor loadings of each evaluation word for high-level impressions. The factor analysis was performed using nine evaluation words (except "slick") because the number of evaluation words must be smaller than the number of samples. The cumulative contribution ratio up to the third factor is 81.40%.

There are three factors for high-level impressions. The first consists of the words "sparkling," "nonuniform," "bumpy," "lumpy," "clear," "feels premium," and "simple." We define this factor as "randomness" because the first factor is positively correlated with "nonuniform" and "sparkling" and negatively correlated with "simple." The second and third factors consist of the words "stately" and "fine," respectively, and hence we call these factors "stateliness" and "fineness."

Subjective scores of high-level impressions were calculated by factor analysis, and Figure 5 shows that for
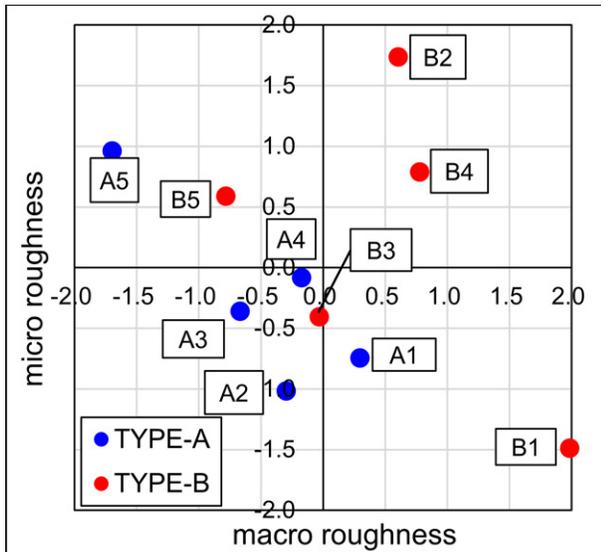
Figure 4. Subjective scores of low-level impressions for each sample. The blue marker indicates the samples with coating material TYPE-A and the red marker indicates TYPE-B.

Table IV. Results of factor analysis for high-level impressions.

	Factor 1	Factor 2	Factor 3		
sparkling	1.015	0.054	0.324	⇒	randomness
nonuniform	0.906	−0.075	0.045		
bumpy	0.782	0.132	−0.187		
lumpy	0.588	0.367	−0.051		
clear	0.578	0.407	−0.103		
feels premium	−0.732	0.344	−0.109		
simple	−0.939	0.082	0.196		
stately	−0.243	1.125	0.100	⇒	stateliness
fine	0.072	0.089	0.944	⇒	fineness

each sample. This result indicates that randomness increases with increasing size of particles. As regards high-level impressions, there is no difference among the types of paints. The quantity of particles does not show a simple relation to high-level impressions.

3. EXPERIMENT 2

We modeled the relationships among the five impression factors and the characteristics of crinkle-finished surface images. We measured the image characteristics using the processes described below and modeled the relationship using multiple regression analyses.

3.1 Methods

Figure 6 shows a schematic diagram of the multi-angle measurement system that we constructed to collect images of crinkle-finished samples. The system can measure the samples at various lighting and camera angles. The lighting device is a Xe light source (MAX-303, Asahi Spectra Co., Ltd., Tokyo, Japan). The light beam is parallelized by a rod
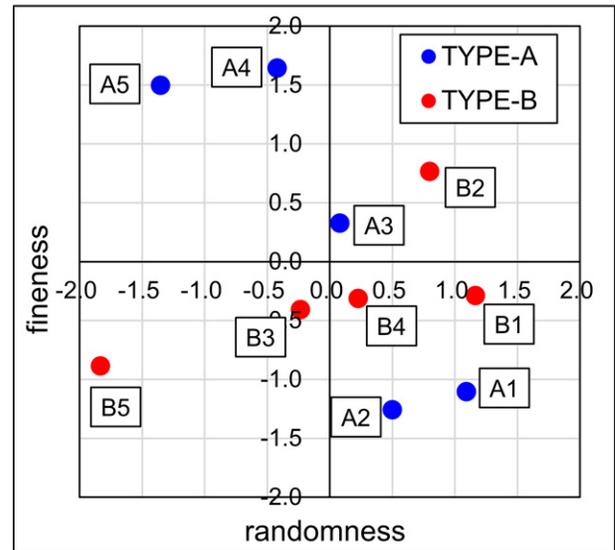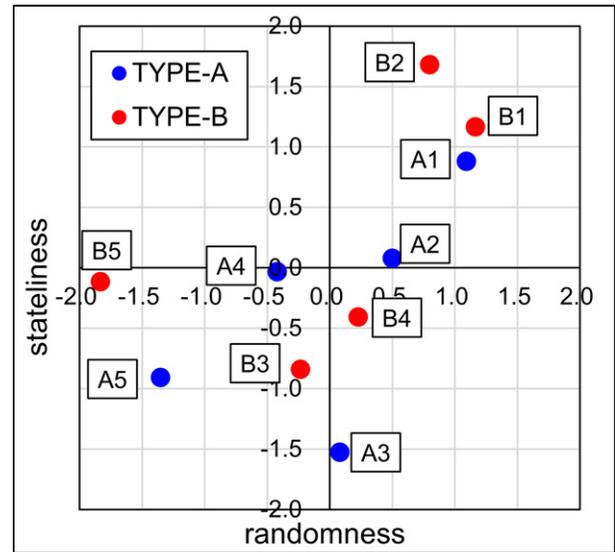

Figure 5. Subjective scores of high-level impressions for each sample. The blue marker indicates the samples with coating material TYPE-A and the red marker indicates TYPE-B.

lens and a telecentric lens. The camera device is an *XYZ* camera (RTC-21, Ikegami Tsuhinki Co., Ltd., Tokyo, Japan). The *XYZ* camera measures *XYZ* tristimulus values as a pixel value [8]. In this experiment, the resolution of the test images is 40 pixels/mm. The lighting and camera angles are defined as angles from the line that is normal to the measuring surface.

We measured the paint surfaces of the crinkle-finished samples under eight conditions (Figure 7). Table V shows the size of the region of interest (ROI) under each condition. In this report, the measurement conditions are written as "lighting angle [deg]/camera angle [deg]."

Figure 8 shows example test images. Figs. 8(a), (b), and (c) are images of sample A1 under three different conditions (45°/0°, 30°/45°, and 0°/60°, respectively). These three images were measured at the same position. Here, (c) is part of a region of (b) and (b) is part of a region of (a). The sizes of
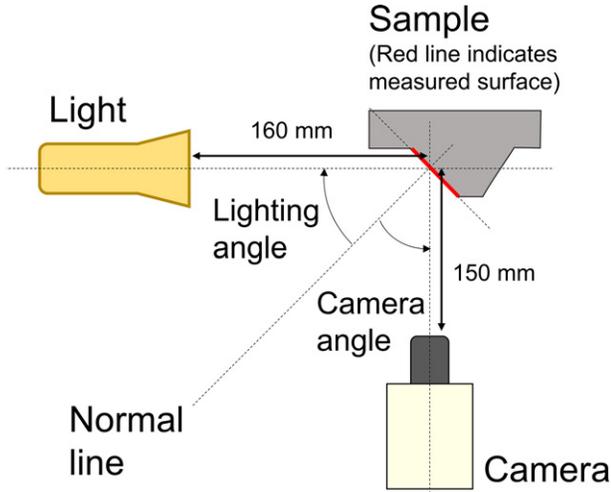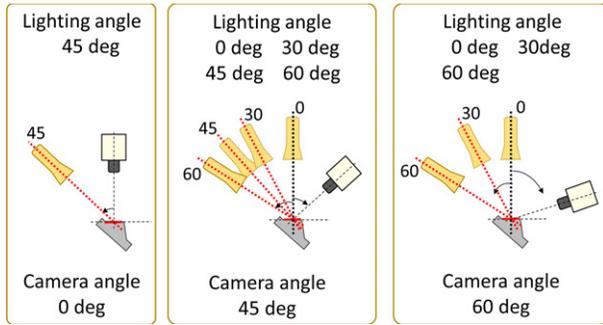
Figure 6. Multi-angle measurement system.

Figure 7. Conditions of the test images.

ROIs were changed due to changing camera angles (shown in Table V). The brightness of particles changes in Fig. 8(a) and (b) as the red circled areas show. In Figs. 8(a) and (c), there are bright points that are smaller than the particles (circled in green).

We calculated the image characteristics using the following methods. First, we measured the Y-channel images of the samples $Y(i, j)$ and a standard white target $Y_s(i, j)$ using the *XYZ* camera under each condition, where (i, j) denote spatial coordinates. Then, we calculated the brightness L^* of each sample to consider human visual characteristics. The L^* images of samples $L^*(i, j)$ were calculated as defined by the International Commission on Illumination as follows:

$$L^*(i, j) = 116 f\left(\frac{Y(i, j)}{Y_s(i, j)}\right) - 16. \quad (2)$$

Here, $f(t)$ is defined as in the following equations:

$$f(t) \begin{cases} t^{\frac{1}{3}} & t < (6/29)^3 \\ [(29/3)^3 t + 16]/116 & t \geq (6/29)^3. \end{cases} \quad (3)$$

Finally, we calculated the following nine image characteristics:

(1) Average L*
This characteristic is the average value of L^* in the ROI.

Table V. ROI size for each condition.

Camera angle (deg)	Size of ROI (pixel)	Size of ROI (mm)
0	600 × 600	15.0 × 15.0
45	424 × 424	10.4 × 10.4
60	300 × 300	7.5 × 7.5

(2) Standard deviation of L*
This characteristic is the standard deviation of L^* in the ROI.

(3) Average L*of the base and particle regions
The L^*-channel images in the ROI were divided into base and particle regions using a threshold set for the average value of L^* in the samples. The average values of L^* in each region are defined as the average L^* values of the base and particle areas, respectively.

(4) Contrast of L*
This value is the absolute value of the difference between the average L^* values of the base and particles.

(5) Low and high spatial frequency characteristics
Figure 9 shows how the spatial frequency characteristics are calculated. As shown in Fig. 9(a), we calculated spatial frequency using the Fourier transformation of the test images and transformed the results into one-dimensional values by averaging the spatial frequency concentrically. As shown in Fig. 9(b), the integral of the one-dimensional spatial frequency values over a frequency range (0.5–2.0 and 4.0–10 cycles/mm for low and high spatial frequencies, respectively) is used as a spatial frequency characteristic [4]. The low spatial frequency characteristic corresponds to the size of the larger particles and the high spatial frequency characteristic corresponds to that of the smaller particles.

(6) Number of particles
We binarized the L^*-channel images using a threshold to divide them into particle and base regions. Then, we calculated the number of particles in the image.

(7) Average particle area
The average particle area was calculated from each connected component of the binarized images.

(8) L* change at 45° and 60°
The difference of the average L^* under highlighted (specular reflection) conditions and shaded (diffuse reflection) conditions is defined as the L^* change. The L^* change at 45° is the difference between 45°/45° (specular) and 0°/45° (diffuse) images. The L^* change at 60° is the difference between 60°/60° (specular) and 0°/60° (diffuse) images.

(9) Particle L*change
The difference in L^* values for the particle regions between near-specular and diffuse conditions is defined as the particle L^* change. The difference between 30°/45° and 0°/45° was calculated.
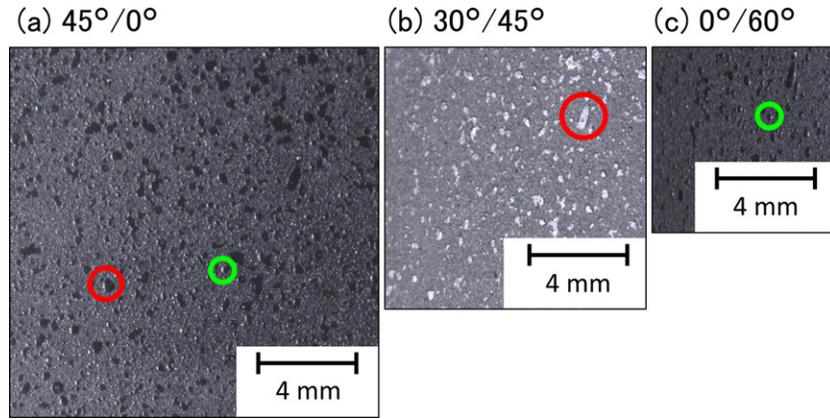
(a) 45°/0°   (b) 30°/45°   (c) 0°/60°

Figure 8. The results of measurement images.

Image characteristics 1–9 were calculated for each of the eight test conditions (see Fig. 4). Therefore, a total of 75 image characteristics were calculated for each sample.

We derived formulas to predict the five impression factors using multiple regression analyses with a stepwise method. In these analyses, the objective variables are the factor scores of the five factors and the explanatory variables are the image characteristics. The values of the image characteristics have dissimilar ranges. Therefore, the standardized Z scores of the image characteristics were used as the explanatory variables.

3.2 Results

3.2.1 Macroroughness
Macroroughness is estimated as follows:

$$\text{Macroroughness} = 0.978 \times x_{11}. \qquad (4)$$

Here, x_{11} is the 45°/45° high spatial frequency characteristic. Figure 10 shows the relationship between the values predicted from Eq. (4) and the subjective scores for macroroughness obtained by the impression evaluation experiments.

Equation (4) indicates that macroroughness is highly positively correlated with the 45°/45° high spatial frequency characteristic. The R-squared value of Eq. (4) is 0.95. By k-fold cross-validation ($k = 11$), a mean R-squared value of 0.924 was obtained.

3.2.2 Microroughness
Microroughness is estimated as follows:

$$\text{Microroughness} = 0.529 \times x_{21} - 0.51 \times x_{22} - 1.03 \times x_{23}. \qquad (5)$$

Here, x_{21} is the 45°/0° standard deviation of L^*, x_{22} is the 60°/45° base value of L^*, and x_{23} is the 0°/45° average particle area. Figure 11 shows the relationship between the values predicted from Eq. (5) and the subjective scores.

Equation (5) indicates that microroughness is positively correlated with the standard deviation of L^* and negatively correlated with the base value of L^* values and the average

particle area. The R-squared value is 0.863. By k-fold cross-validation ($k = 11$), a mean R-squared value of 0.664 was obtained.

3.2.3 Randomness
The following equation estimates randomness:

$$\text{Randomness} = 0.976 \times x_{31}. \qquad (6)$$

Here, x_{31} is the 45°/30° average particle area. Figure 12 shows the relationship between the values predicted from (Eq. (6)) and the subjective scores.

Equation (6) indicates that randomness is positively correlated with particle areas. The R-squared value is 0.961. By k-fold cross-validation ($k = 10$), a mean R-squared value of 0.937 was obtained.

3.2.4 Stateliness
Stateliness can be estimated as follows:

$$\text{Stateliness} = 0.701 \times x_{41} + 0.771 \times x_{42} - 0.811 \times x_{43}. \qquad (7)$$

Here, x_{41} is the 45°/0° low spatial frequency characteristic, x_{42} is the 30°/60° standard deviation of L^*, and x_{43} is the 60°/60° standard deviation of L^*. Figure 13 shows the relationship between the values predicted from Eq. (7) and the subjective scores.

Equation (7) indicates that stateliness is positively correlated with low spatial frequency characteristics and the 30°/60° standard deviation of L^*. Furthermore, it is negatively correlated with the 60°/60° standard deviation of L^*. The R-squared value is 0.973. By k-fold cross-validation ($k = 10$), a mean R-squared value of 0.921 was obtained.

3.2.5 Fineness
Fineness is estimated as follows:

$$\text{Fineness} = 1.817 \times x_{51} - 1.582 \times x_{52} - 1.676 \times x_{53}. \qquad (8)$$

Here, x_{51} is the 0°/45° contrast of L^*, x_{52} is the 0°/45° standard deviation of L^*, and x_{53} is the 0°/60° contrast

(a)

Measuring image

FFT

2D spatial frequency

Averaging

1D spatial frequency

(b)

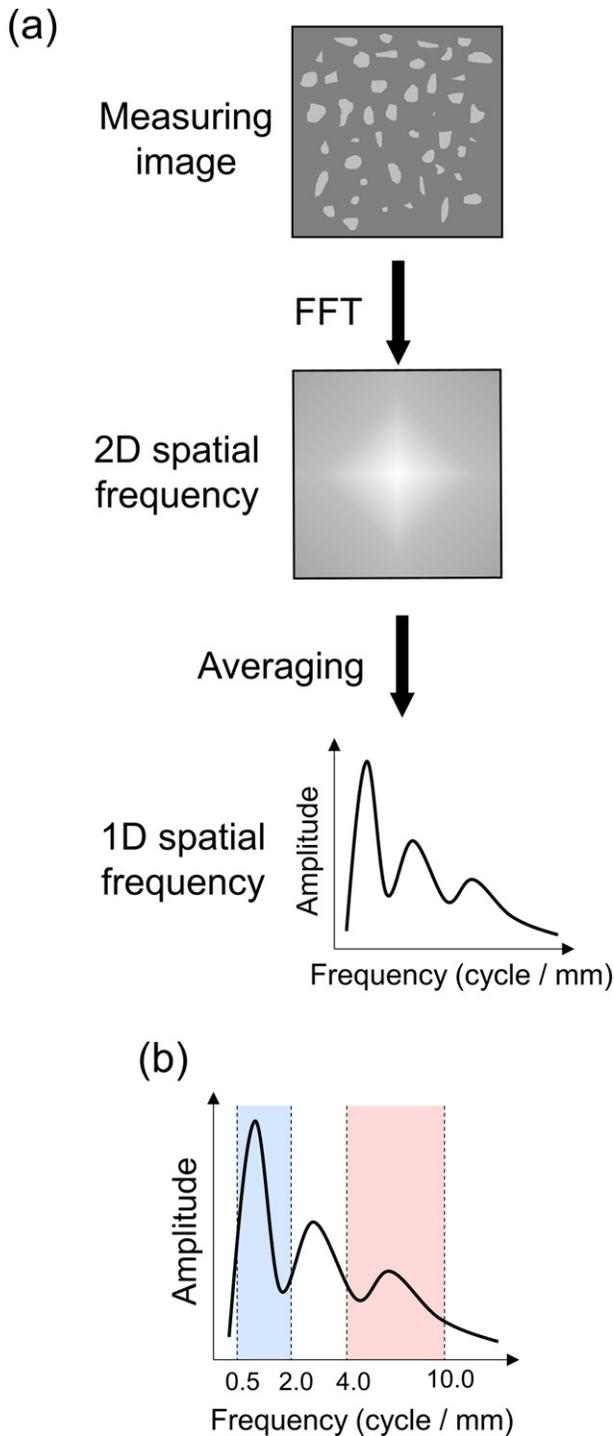**Figure 9.** (a) Procedure for calculating frequency characteristics. (b) Ranges of low- and high-frequency characteristics.

Figure 10. Predicted values and subjective scores for macroroughness.

Figure 11. Predicted values and subjective scores for microroughness.

Figure 12. Predicted values and subjective scores for randomness.

of L^*. Figure 14 shows the relationship between the values predicted from Eq. (8) and the subjective scores.

Equation (8) indicates that fineness is positively correlated with the $0°/45°$ contrast of L^*. Furthermore, it is negatively correlated with the $0°/45°$ standard deviation of L^* and the $0°/60°$ contrast of L^*. The R-squared value is 0.957. By k-fold cross-validation ($k = 10$), a mean R-squared value of 0.937 was obtained.
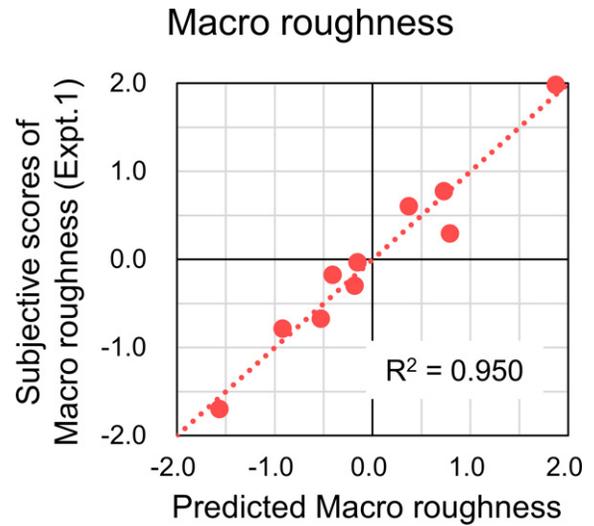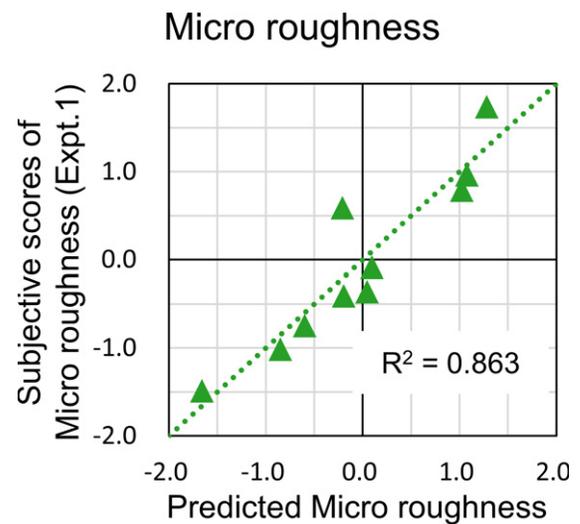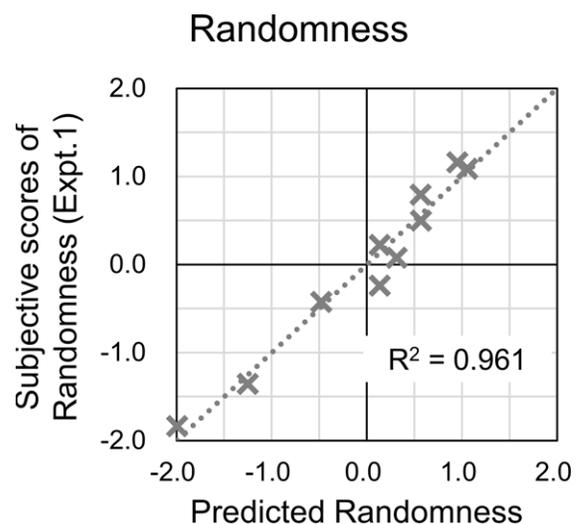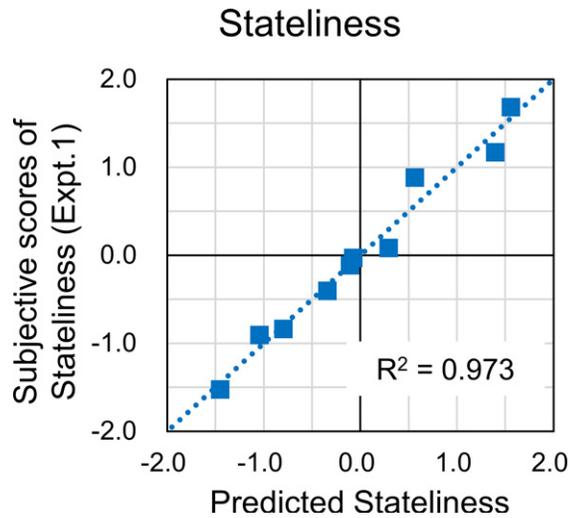
Stateliness

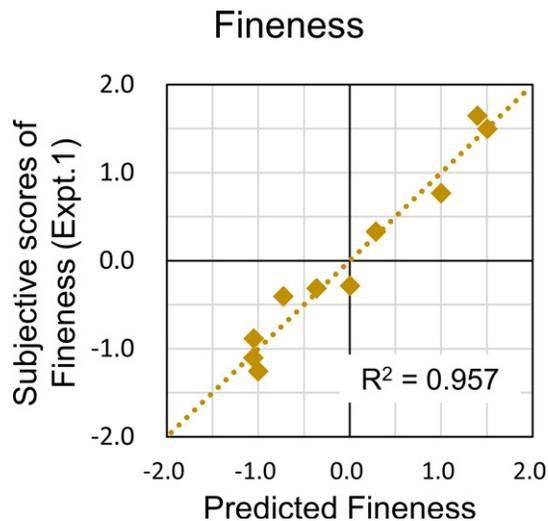Figure 13. Predicted values and subjective scores for stateliness.

Fineness

Figure 14. Predicted values and subjective scores for fineness.

4. DISCUSSION

A crinkle finish is usually used on digital cameras to provide a premium feeling. However, the results of the impression-word appropriateness test did not include "feels premium" as an appropriate term for crinkle-finished surfaces. Hence, subjects are not given much of a premium-feeling impression from a limited observation area of a planar part. This indicates that the premium feeling of a digital camera is affected by the overall shape of the camera.

Macroroughness is positively correlated with the high spatial frequency characteristic of the finish under specular conditions. This indicates that users perceive the luminance changes at the spatial frequency corresponding to the size of particles as macroroughness.

Microroughness is positively correlated with the variation of L^* and negatively correlated with the value of L^* in the base and particle areas. This indicates that users feel

microroughness strongly when there are large luminance changes, a dark base, and small particles.

Randomness is positively correlated with the particle area. This result indicates that crinkle-finished surfaces with large particles invoke a strong feeling of randomness.

Stateliness is positively correlated with the low spatial frequency characteristic and the variation of L^* under diffuse conditions and negatively correlated with L^* variation under specular conditions. This indicates that large particles invoke a strong feeling of stateliness in users. Furthermore, users feel stateliness strongly when they see many bright points under diffuse conditions and view uniform brightness under specular conditions.

Fineness is positively correlated with the $0°/45°L^*$ contrast and negatively correlated with the $0°/45°$ variation and the $0°/60°$ contrast of L^*. We believe that the $0°/45°$ contrast corresponds to the impression of the particles. However, the $0°/45°$ variation and the $0°/60°$ contrast of L^* correspond to the glitter of tiny light spots. Therefore, the results of this study show that users feel fineness strongly when the impression of particles at $0°/45°$ is strong and the glitter of particles at $0°/45°$ and $0°/60°$ is low.

5. CONCLUSION

We conducted an impression-word extraction test, impression-word appropriateness test, and rating word distance measurement test to extract evaluation words that represent the impressions of crinkle-finished surfaces.

The results of the impression evaluation tests indicate that low-level impressions consist of macroroughness and microroughness. High-level impressions consist of randomness, stateliness, and fineness. Furthermore, the words "feels premium" were not chosen as an evaluation term in the impression-word appropriateness tests.

Equations to predict five impression factors from test image characteristics were derived using multiple regression analyses. These prediction models indicate that impression factors are affected by not only simple particle parameters like quantity and size but also appearances at various lighting and observation angles. These proposed models enable attractive crinkle-finished surfaces to be designed. They further prevent designers from designing crinkle finishes with unintended or negative impressions. These models can improve the affective value of DSLR cameras.

In future, we will model the relationship between low-level and high-level impressions. Furthermore, we will analyze the impressions of the overall appearance of a DSLR camera, including paints and shapes.

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