CHAPTER VII

CONCLUSIONS

7.1 Conclusions

The results from the investigation of quantitative indices for evaluating the degree of dispersion of additives in compounded materials using computer experiments may be concluded as follows:

7.1.1 Single additive system

1. The degree of mixedness for both the ideal uniform and normal random dispersions decreases as the additive concentration or particle size increase.

2. The count-based and area-based fractal dimensions are more suitable indexes because they were not affected by the particle size. Furthermore, the area-based fractal dimension for the ideal uniform dispersion remains essentially constant around 1.0, as the additive concentration varies.

3. In a nonideal system, the normalized count-based fractal dimension is more suitable to investigate the degree of dispersion of additive because it takes into account the effect of additive concentration.

7.1.2 Binary additive system

1. The degree of mixedness of B particles decreases when the adhesion probability, concentration ratio or particle size ratio increases, except in the case of uniform dispersion of A - normal dispersion of B.

2. Both types of the normalized fractal dimensions of B particles are good indexes because they are sensitive only to the adhesion probability and concentration ratio, regardless of the particle size ratio.

3. The normalized count-based fractal dimension of A plus B particles decreases as the adhesion probability or concentration ratio increases. However, it is hard to discern the effect of the particle size ratio on the normalized count-based fractal dimension of A plus B particles.

4. It is hard to predict the effects of the adhesion probability , concentration ratio or particle size ratio on the normalized area-based fractal dimension of A plus B particles when the area of each A particle is much greater than the area of a B particle.

5. The coordination number obtained as mean and mode increases as the adhesion probability or concentration ratio increases, but the coordination number is by definition independent of the particle size ratio.

6. Both types of the normalized fractal dimension of B particles can be used to investigate the degree of dispersion, type of dispersion of A and B particles and the probability of B particles adhering onto A particles for a system in which the concentration ratio and particle size ratio are known.

7.2 Recommendation for further study

As the next step of study, computer simulation of the single and binary additive systems should be extended to three-dimensional space. Alternatively, the dispersion of multiple additive systems should be simulated to investigate the effects of the concentration ratio, particle size ratio, adhesion probability and so on.

Simultaneously, more experimental work should be carried out to support or verify the present and future simulation results.