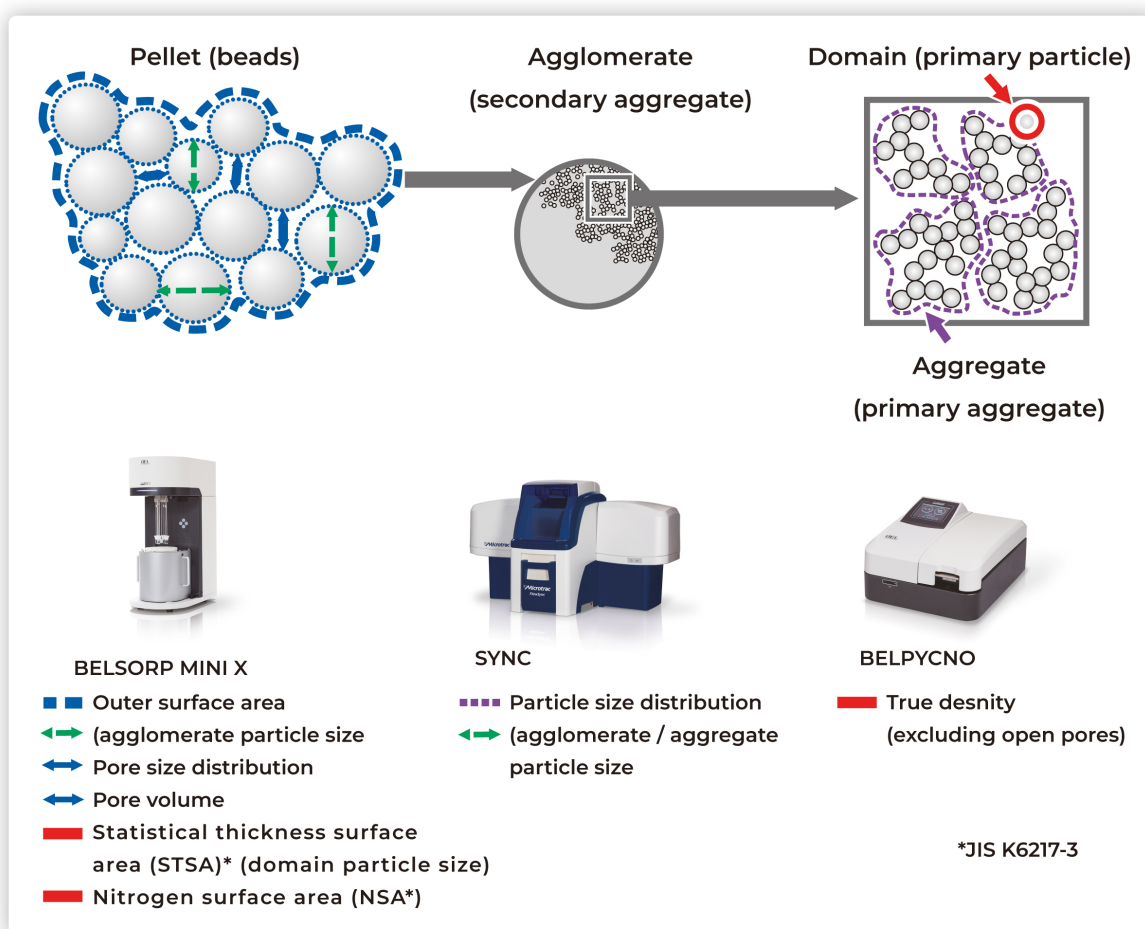


Carbon Black Structure Evaluation with Various Measuring Methods

Overview

Carbon black, which is utilized as a rubber/plastic filler, a pigment or a material for electrodes, is known to assume either a minimum unit aggregate structure (primary aggregate) made up chiefly of primary particles (domain) or an agglomerate structure (secondary aggregate). Physical properties of carbon black can be discussed primarily from the viewpoint of particle size, particle surface properties (presence of functional groups and distribution of pores) and structure (degree of aggregate formation). Here, the physical properties of carbon black will be evaluated.

Apparatus and Parameters Evaluated



Material Tested

Standard carbon black (SRB-8E)

Discussion

■ Pore size distribution

The pore size distribution measured by the mercury intrusion method showed a reduction of the spaces between the agglomerate and the aggregate as well as condensation of these spaces. Of the pore size distributions determined by the adsorptive and desorptive methods, the distribution determined by the desorptive method was more consistent compared to that of the mercury intrusion method. Thus, both methods were capable of accurately measuring the size of the bottle neck part.

■ Particle size distribution

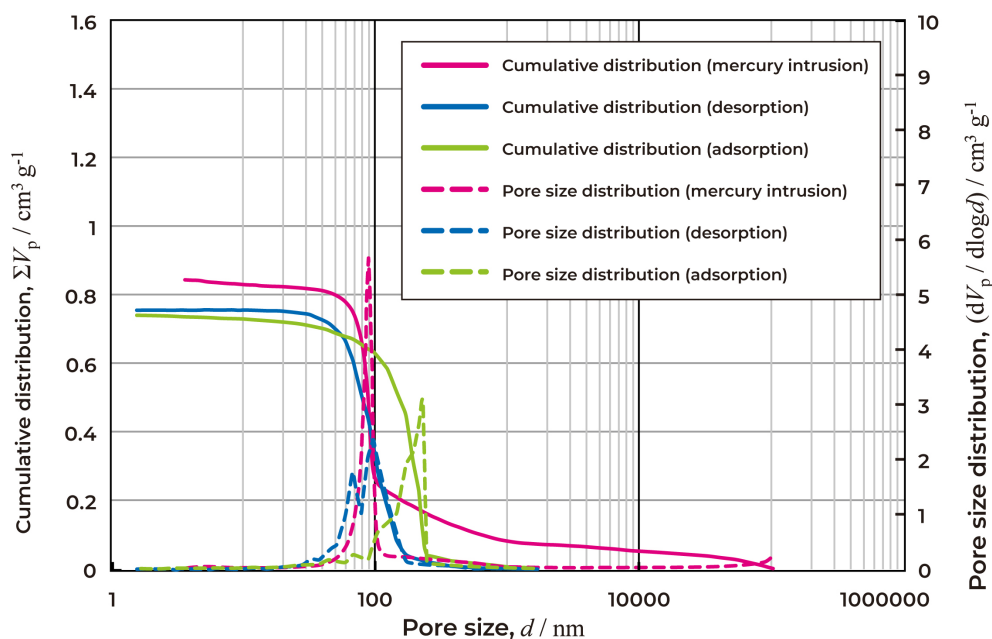
Laser diffraction analysis revealed particle size distribution of the aggregate while the data on STSA, outer surface area and true density showed the mean particle size of the domain and agglomerate.

Conclusions

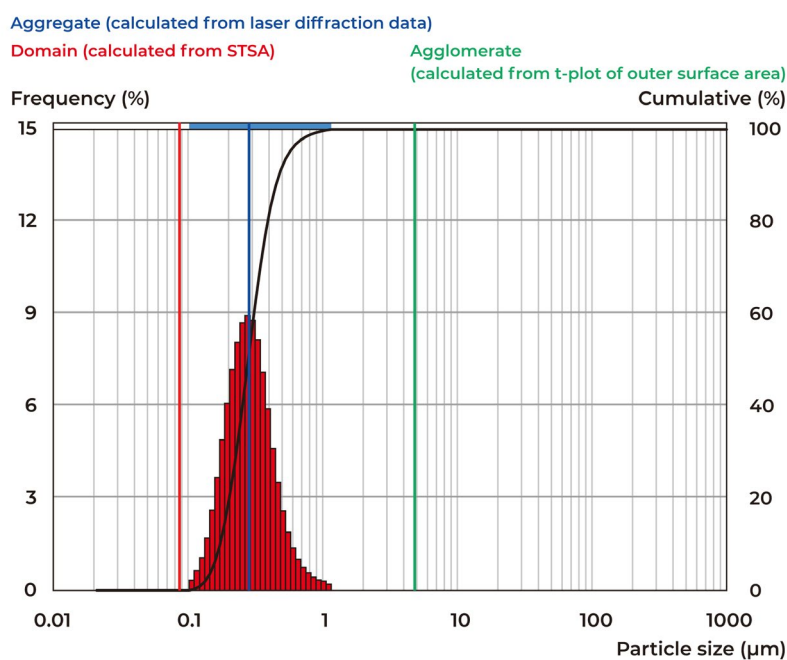
In the past, it was difficult to conduct a detailed evaluation of the carbon black structure using a single device. However, combining multiple methods (adsorption, diffraction/ light scattering, mercury intrusion, etc.) enabled a more detailed evaluation of the size of each constituent particle and the size of the space between the particles.

Results of Measurement

■ Pore size distribution determined by mercury intrusion method and BJH method (BELSORP MINI X)



■ Particle size distribution determined by mercury intrusion method and BJH method (BELSORP MINI X)



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