Supporting Information

1. Aspect ratio of the deposited nanocrystal agglomerates

To characterize the shape of impacted agglomerates quantitatively, the aspect ratio of the impacted agglomerates was calculated. The sample shown in Figure S1 shows an example. The longer dimension, denoted as axis **a**, has a length of 87.3 nm, and the shorter dimension, denoted axis **b**, has a length of 82.1 nm. Thus, the aspect ratio of this deposit is $a/b \approx 1.063$. The size of this deposit is defined as the average of a and b, i.e. $(a+b)/2 = 84.7$ nm. Following the same method, the size and aspect ratio of agglomerates impacted on carbon substrates at 2 cm/s and 150 m/s (Figure 3a and 3b) were calculated. The results are summarized in Figure S2. For impacted agglomerate sizes below 250 nm, the aspect ratios are all located in the range from 1.0 to 1.4, indicating a relatively circular shape of the deformed nanospheres.

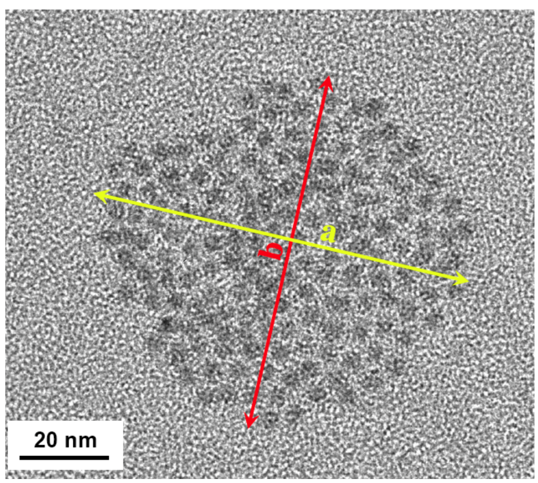

Figure S1. TEM image of an impacted nanocrystal agglomerate on carbon substrate. Axis a, shown in yellow, is the longer dimension of the deposited agglomerate. Axis b, in red, is the shorter dimension.

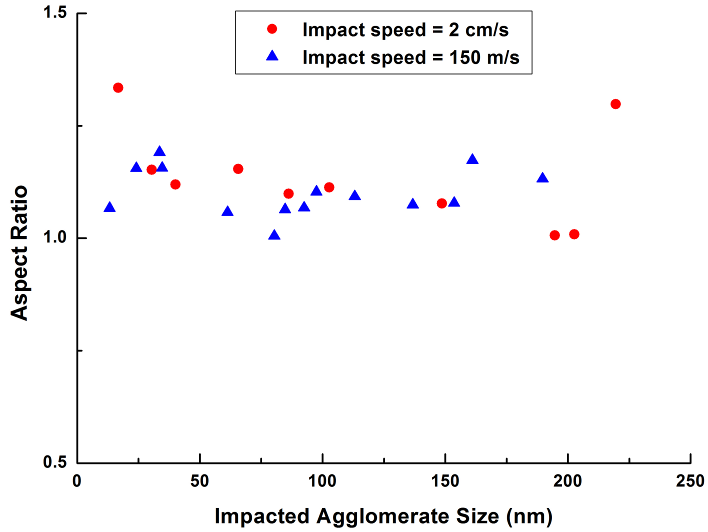

Figure S2. Relationship between the impacted agglomerate size and corresponding aspect ratio. Red dots are for samples impacted at 2 cm/s. Blue triangles represent samples impacted at 150 m/s.

2. Determination of the thickness of deformed nanocrystal agglomerates

Figure 5(a) shows a STEM image of a monolayer of 16 nanocrystals on carbon substrate. Since the nanocrystals are nearly monodisperse, the peak brightness of each single nanocrystal in Figure 5(b) is also close to each other. Here, we use the one monolayer of nanocrystal as the unit of measure to determine the height of the deformed agglomerates. As the local brightness is proportional to the thickness of the material in STEM images in this case, the thickness can be determined the formula as following:

$$\text{Thickness of the deformed agglomerate} = \frac{240-10}{60-10} \approx 4.6 \text{ monolayers.}$$

For the sample shown in Figure 5(a), we know that the maximum brightness is 200, that peak brightness of an individual nanocrystal is 192 (red dotted box), and that the background brightness is about 35, by reading the brightness intensity curve shown in Figure 5(b). Thus, the thickness of this sample is (200-35)/(192-35)≈1.05 monolayers, which is consistent with the single monolayer shown in the figure.

In the same manner, we can obtain the thickness of the sample shown in Figure 5(c), which is (240-10)/(60-10) ≈4.6 monolayers.

2. Estimation of the number of nanocrystals

The integral brightness over an area was used in the estimation the number of nanocrystals in the STEM image, which means the sum of brightness of each pixel within a selected region. If we use the integral brightness of a single nanocrystal as the base, then the total number of nanocrystals in the sample can be estimated by the following formula:

$$\text{Number of Nanocrystals} = \frac{\text{Integral brightness of the whole sample} - \text{Background}}{\text{Integral brightness of a single nanocrystal} - \text{Background}}\ .$$

For the background brightness, the average background brightness per pixel was firstly obtained by sampling a dark region in the image. Then the background brightness for the sample and the individual nanocrystal were the product of the pixel background brightness and the number of pixels in the selected area.

Take the sample in Figure S3(a) for example. The yellow dotted square denoted the selected area for the integral brightness of the whole sample, and the red square was selected the region to calculate the integral brightness of a single nanocrystal. Thus, the total number of nanocrystals in the sample is (2602072.3-0.093×191×170)/(155064.5-0.093×33×33)≈ 16.8. By counting the number of nanocrystals directly from the image, we know the exact number is 16. The number of nanocrystals in Figure S3(b) and (c) can be estimated in the same manner. The results of estimation are summarized in Table S1. The errors of estimation are 5%, -11%, and 6%, respectively. More comparisons between the estimation and direct counting have been done, which turn out that the maximum error of the estimation is about 15%. Thus, 15% error bars were marked on the data points in Figure 5(e).

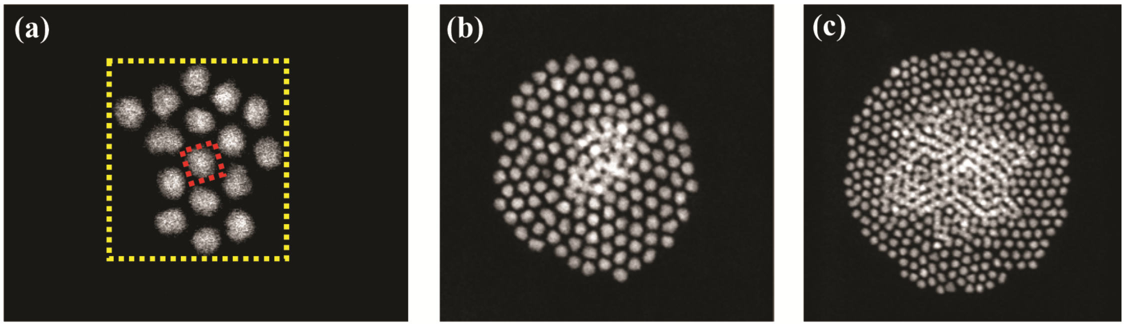

Figure S3. STEM images of impacted nanocrystal agglomerates on carbon substrate. The agglomerate consists of (a)16 nanocrystals, (b) ~ 152 nanocrystals, and (c) ~510 nanocrystals. The diameter of the each nanocrystal is about 4.7 nm.

Table S1. The comparison between the estimated number of nanocrystals in the sample and the actual number by direct counting STEM images.

Sample	Estimated Number	Actual Number	Error
(a)	16.8	16	5%
(b)	135.7	152	-11%
(c)	541.2	510	6%