Template-Assisted GLAD: Approach to Single and Multi-patch Patchy Particles with Controlled Patch Shape

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Supporting Information:

Method to measure patch size:

The patch size (coated area percentage, $A\%$) on the PS particles is measured using the following approach. The surface of a sphere is divided evenly by planes that pass through the center of the sphere, where the angle between each two adjacent planes is $360°/m$ and m is an integer, as shown in Figure S1A. Further, the sphere surface can also be divided evenly by parallel planes that are perpendicular to the cross section of the sphere when the distance between each two adjacent planes is r/n (the first plane goes through one of the poles of the sphere), where r is the radius of the sphere and n is an integer (Figure S1B). Sectioning a sphere in this fashion, leads to a surface that is divided into $2 \times m \times n$ sections with an identical surface area. Now, one point is chosen from each section and its orthogonal projection onto a plane perpendicular to the diameter is obtained such that each of these orthogonal projection points correspond to one piece of the sphere surface

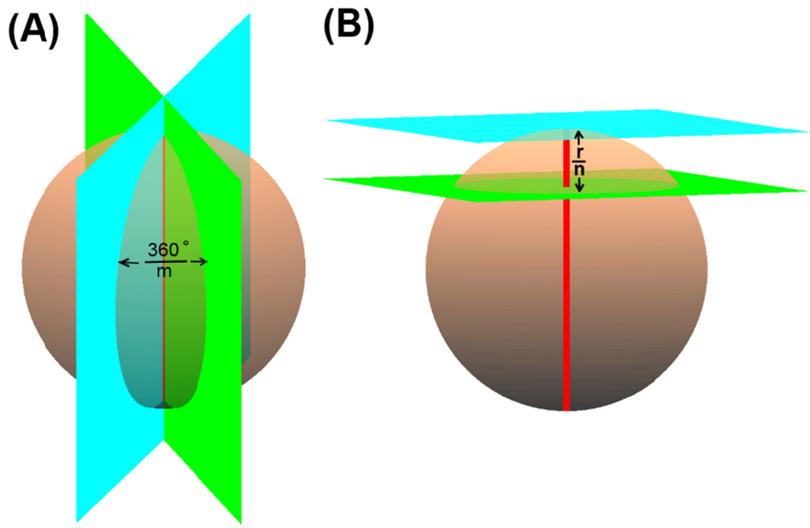

Figure S1. Schematic of planes used to cut sphere surface evenly. (A): sphere surface is cut by planes cutting through the sphere center while keeping the angle by which adjacent planes are rotated the same, $360°/m$. (B): sphere surface is cut by parallel planes perpendicular to the same diameter while keeping the distance of adjacent planes the same, r/n. The red line is the sphere diameter.

transferring the calculation of the sphere surface area to counting the number of points on a plane. Figure S2 shows the distribution of the projection points on the 2D plane. For the SEM images of patchy particles, the radius of the particle is first determined in pixels. Based on the value of the radius, the coordinates of each orthogonal projection point are calculated. The area of the patch will be determined by counting the number of these orthogonal projection points covered by the patch. Figure S3 shows one example of a patch size calculation, in which the light green color shows the patch and the number of dots covered by this patch is counted to about 29 which means the patch size (coated are percentage) is about 7.25% ($29 \div (2 \times 20 \times 10)$). The precision of the patch surface area can be improved by increasing the values of m and n.

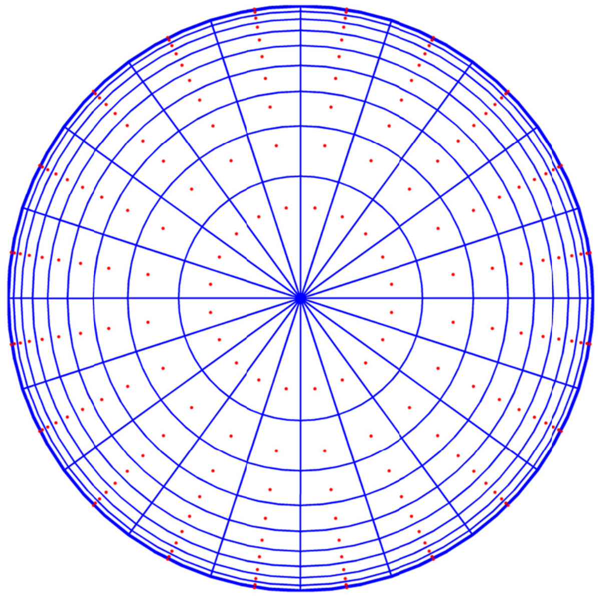

Figure S2. Distribution of projection points on plane. Each point corresponds to one piece of the spherical surface having the same surface area.

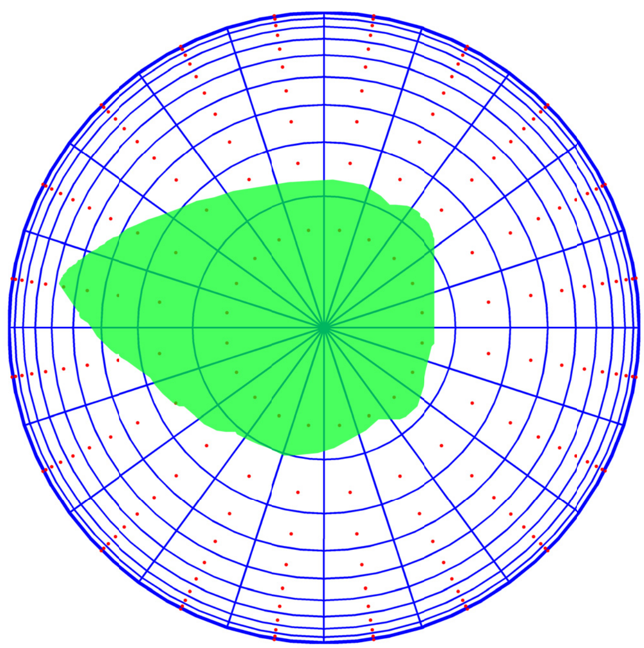

Figure S3. Schematic of patch Patch size is calculated by counting the number of dots covered by the patch. The patch is shown by the light green color, and the m and n are 20 and 10 respectively.