

## Supporting information for

# ‘Size exclusion chromatography of quantum dots by utilizing nanoparticle repelling surface of concentrated polymer brush’

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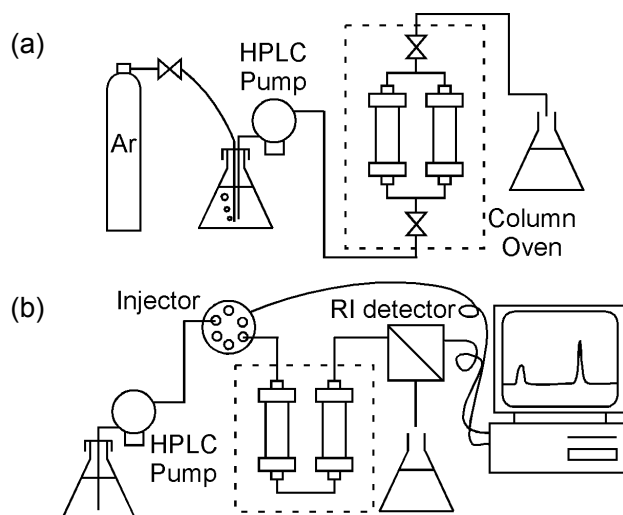
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### 1. Set up for surface initiated ATRP in the columns and SEC of NPs:

Set up for immobilization of concentrated PMMA brush to the silica monolith columns:  
Immobilization of concentrated PMMA brush to the silica monolith column was performed with the set up described in Scheme S1(a).

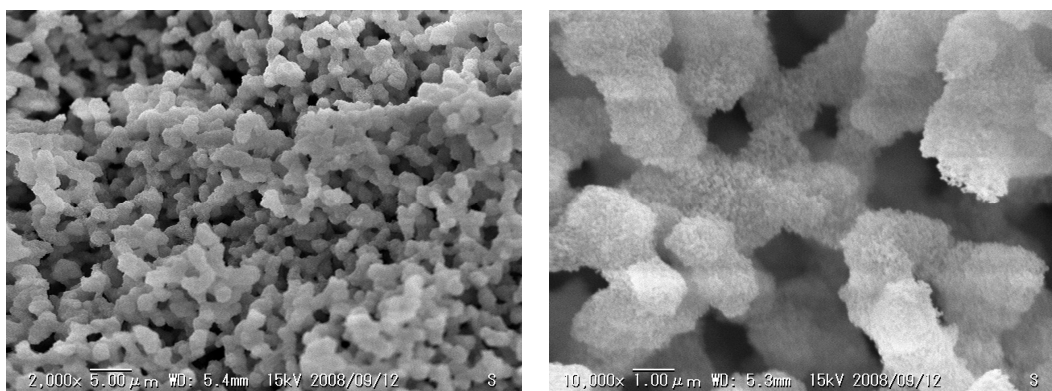


**Scheme S1.** (a) Set up for the in-line immobilization of ATRP initiator (BHE) and surface initiated ATRP. The oxygen was eliminated by Ar bubbling and the oxygen free solutions could be pumped to the columns. The inlet and outlet valves were closed during the reactions to keep the columns away from oxygen. (b) Set up for the SEC of NPs.

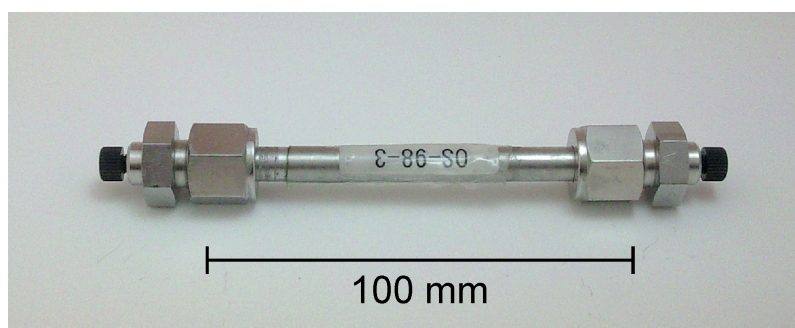
Set up for SEC of NPs: The set up for the SEC of NPs was presented in Scheme S1(b). The tubes connecting each unit and injector were covered (wrapped) by heat insulating material to obtain stable separation.

## **2. The images of the silica monolith column.**

Here, we show the images of the silica monolith columns. Figure S1 depicts the image of the surface of the silica monolith column utilized in this study. Figure S2 depicts the appearance of the silica monolith column that we bought from Kyoto Monotech Co., Ltd. From Figure S1, one can easily imagine the SEC potential of the silica monolith columns, if we could avoid adsorption of NPs on its surface.



**Figure S1.** SEM image of the silica monolith (column) used in this study. Macropore and mesopore size was  $4\ \mu\text{m}$  and  $70\ \text{nm}$ , respectively.

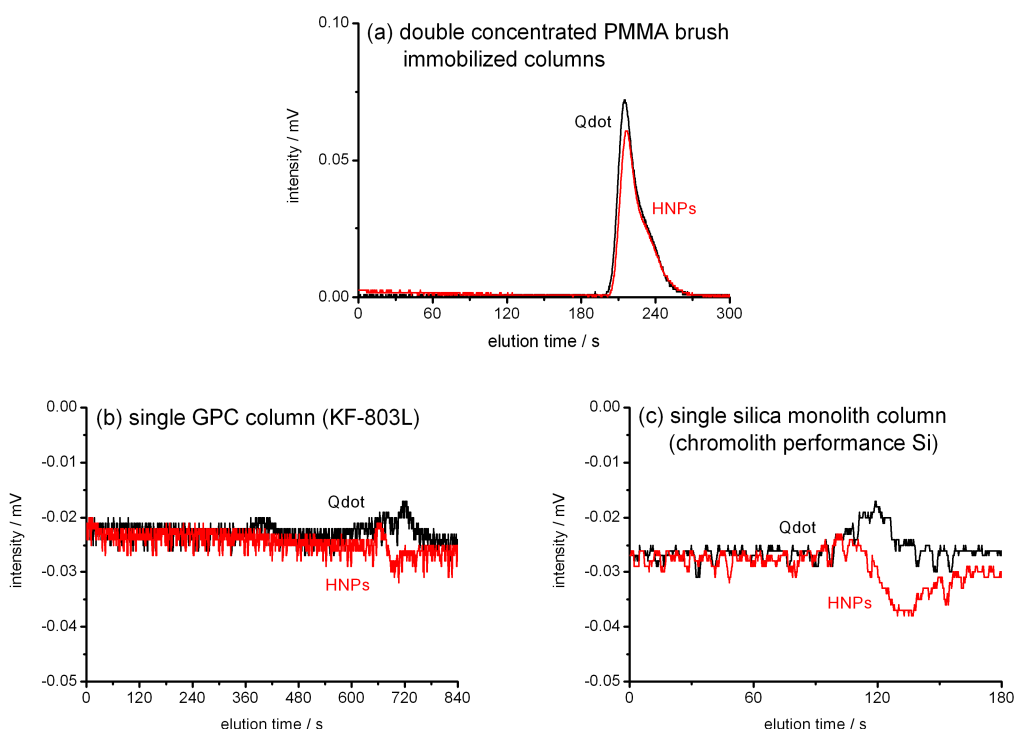


**Figure S2.** Image of the silica monolith column we obtained from Kyoto Monotech Co., Ltd. (OS-98-3,  $L = 100\text{mm}$ ,  $\phi = 4.6\ \text{mm}$ , macropore =  $2.2\ \mu\text{m}$ , mesopore =  $70\ \text{nm}$ )

### **3. Separation using commercially available GPC and silica monolith columns.**

As mentioned in the text, we have examined the separation of NPs by commercially available columns for SEC. We have tested two different types of columns. One is a silica monolith column bought from by MERCK Co., Ltd. (chromolith® performance Si 100-4.6, L = 100mm,  $\phi$  = 4.6 mm, macropore = 2  $\mu$ m, mesopore = 13 nm) as a hydrophilic SEC column. The other is a GPC column bought from SHOWA DENKO Co., Ltd. (SHODEX®, KF-803L, L = 300mm,  $\phi$  = 8 mm, macropore = 2 mm, gel diameter = 6  $\mu$ m, mesopore size = 50 nm, exclusion limit = 70,000 D) as a hydrophobic SEC column. The same solutions of HNPs and mixture of Qdots were used for the injection to these columns. The separations were conducted at the column temperature of 45 °C and THF was used as the eluent at the flow rate of 1mL/min. As one can clearly see in Figure S3, the amounts of the eluted HNPs and Qdots were relatively very smaller than that with the concentrated PMMA brush immobilized columns.

The result shown here implies that the separation of the concentrated PMMA brush immobilized columns is superior to that of commercially available GPC columns tested in this study.



**Figure S3.** Elution curves of the HNPs (red) and cocktail of Qdot@s (black). (a) the SEC by the two of concentrated PMMA brush immobilized columns. (b) the SEC by the GPC column (SHODEX®, KF-803L). (c) the SEC by the silica monolith column (MERCK, chromolith® performance Si 100-4.6). The all the elution of NPs and QDs were finished before the elution of toluene.