

# Design nanoparticles with improved tumor penetration: viewing surface property from molecular architecture

*Long Zhang,<sup>a, b, c</sup> Pengyan Hao,<sup>a, b, c</sup> Dejun Yang,<sup>a, b, c</sup> Sheng Feng,<sup>d</sup> Bo Peng,<sup>b, c</sup> Dietmar Appelhans,<sup>e</sup> Tinghong Zhang,<sup>a, b, c\*</sup> Xingjie Zan,<sup>a, b, c\*</sup>*

<sup>a</sup> School of Ophthalmology and Optometry, Eye Hospital, School of Biomedical Engineering, Wenzhou Medical University, Wenzhou, Zhejiang Province, 325035. PR China.

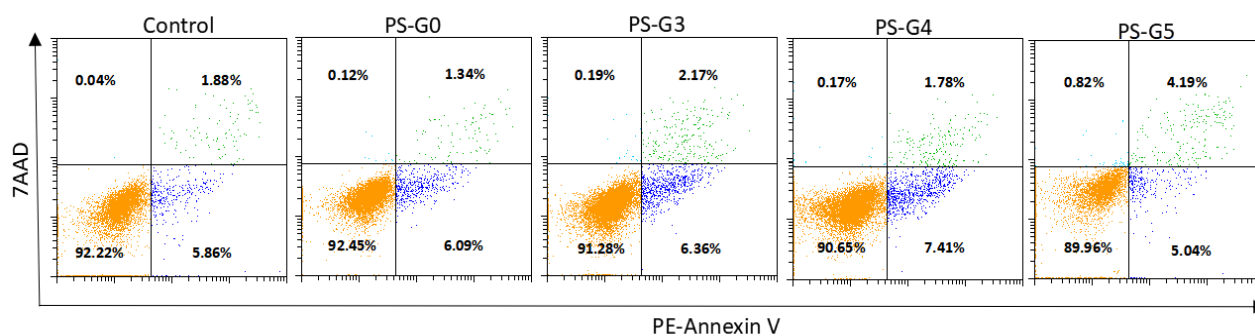
<sup>b</sup> Wenzhou Institute of Biomaterials and Engineering, CNITECH, Chinese Academy of Sciences, Wenzhou, Zhejiang Province, 325001. PR China.

<sup>c</sup> Engineering Research Center of Clinical Functional Materials and Diagnosis&Treatment Devices of Zhejiang Province, Wenzhou Institute of Biomaterials and Engineering, CAS Wenzhou, Zhejiang Province, 325001. PR China

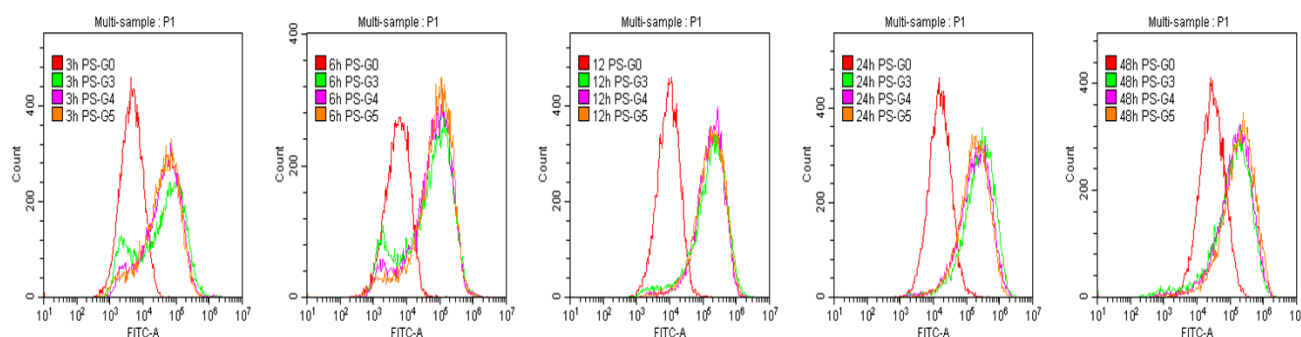
<sup>d</sup> Department of Pathology and Laboratory Medicine, Hospital of the University of Pennsylvania, Philadelphia, Pennsylvania, 19107. USA

<sup>e</sup> Leibniz-Institut für Polymerforschung Dresden e.V., Hohe Str. 6, 01069 Dresden, Germany

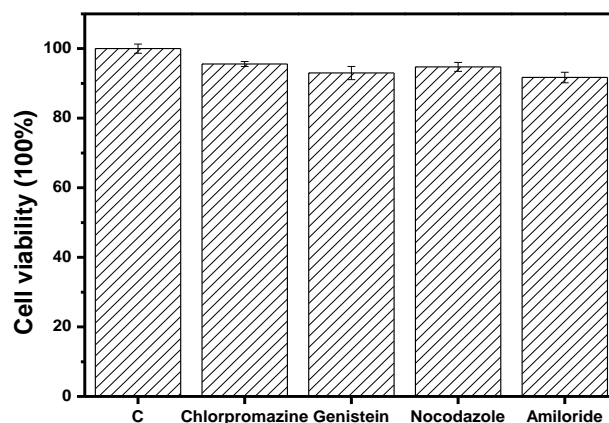
\*Correspondence - Tinghong Zhang, Tel: +86 577 88017546; E-mail: zhangth@wibe.ac.cn.  
Xingjie Zan, Tel: +86 577 8017519; E-mail: [xjzan2000@hotmail.com](mailto:xjzan2000@hotmail.com).



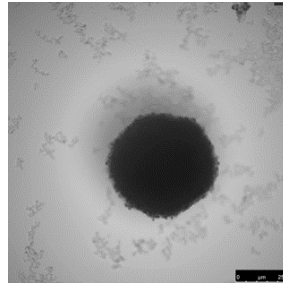
**Fig. S1** Representative image of apoptosis assay by flow cytometry.



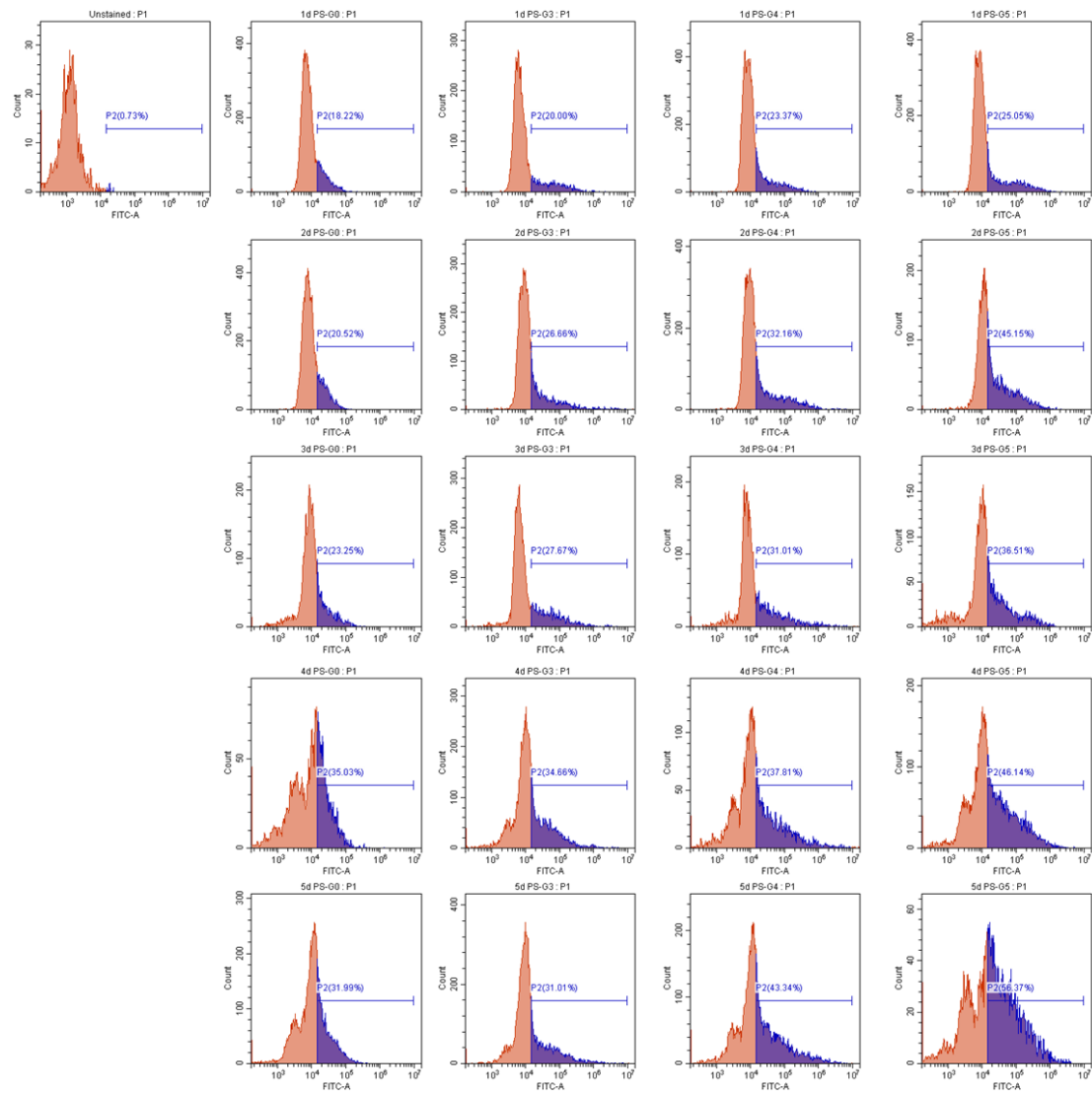
**Fig. S2** Representative image of cellular uptake by flow cytometry.



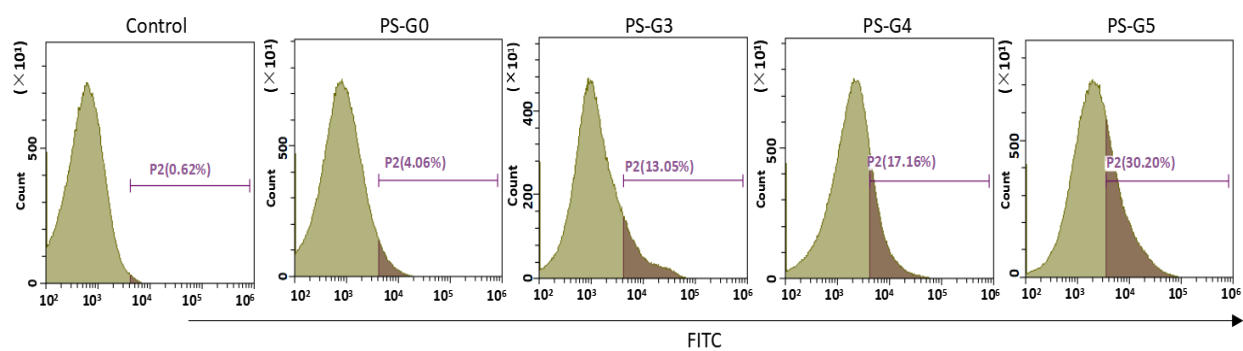
**Fig. S3** The viability tested of HeLa cells after incubating with various inhibitors for 2 h by CCK-8 assay. C: medium treated cells. Chlorpromazine (5  $\mu\text{g/mL}$ ), genistein (100  $\mu\text{g/mL}$ ), nocodazole (5  $\mu\text{g/mL}$ ) and amiloride (25  $\mu\text{g/mL}$ ).



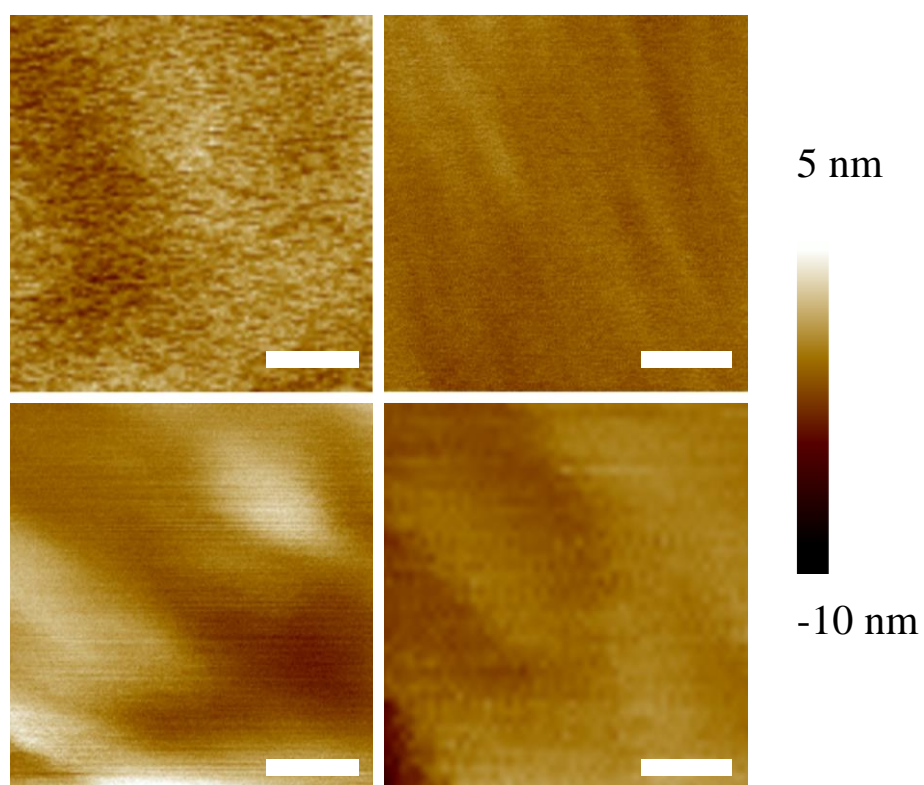
**Fig. S4** Representative image of HeLa spheroids.



**Fig. S5** *In vitro* representative image of tumor penetration by flow cytometry.



**Fig. S6** *In vivo* representative image of tumor penetration by flow cytometry.



**Fig. S7** The AFM images of PS-G0, G3, -G4, -G5. Scale bar: 5 nm