

1 **Supplementary File**

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3 **A Dual-Antibody Gold Nanoparticle Based Lateral Flow Assay for Rapid and Selective**
4 **Detection of Mesenchymal Stem Cell Stemness**

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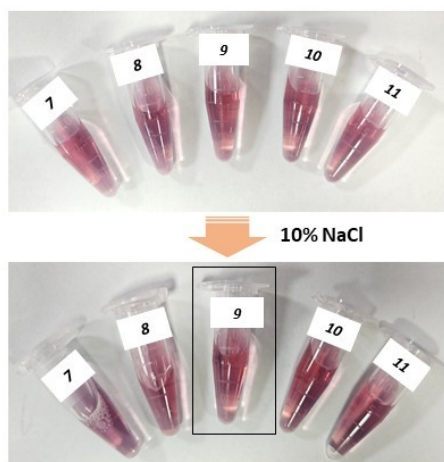
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12 **Supplementary Figure 1**

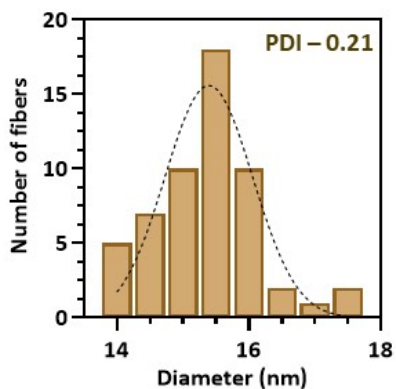


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14 *Supplementary Figure 1: Salt-induced aggregation assay for optimization of pH during*
15 *antibody conjugation to AuNPs. AuNPs suspensions were adjusted to different pH values (7–*
16 *11) and incubated with antibody, followed by the addition of 10% NaCl to induce aggregation.*
17 *Visual color changes indicated nanoparticle stability, where retention of the characteristic red*
18 *color reflected successful antibody adsorption and colloidal stabilization, while purple/blue*
19 *discoloration denoted salt-induced aggregation due to insufficient surface coverage. Among*
20 *the tested conditions, pH 9 exhibited maximal resistance to aggregation, suggested optimal*
21 *conjugation efficiency.*

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23 **Supplementary Figure 2**

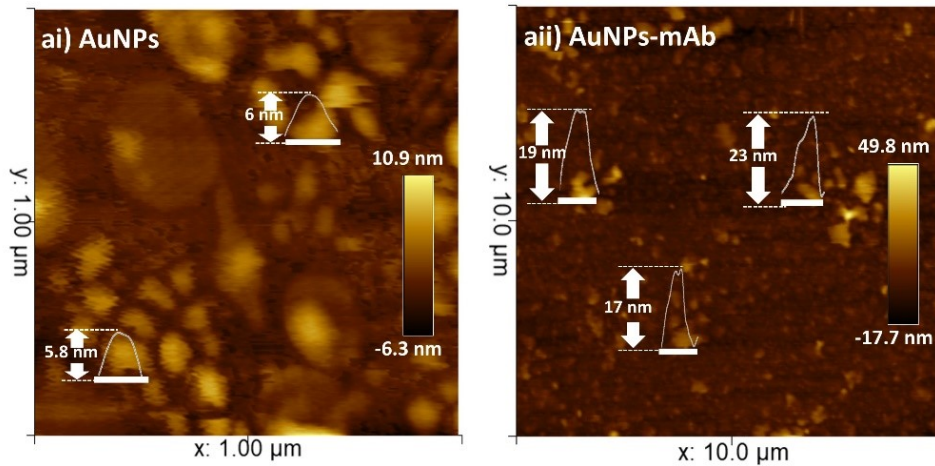


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25 *Supplementary Figure 2: Size distribution histogram of synthesized nanoparticles obtained*
26 *from TEM analysis. The particles exhibit a narrow diameter distribution centered around ~15*
27 *nm with a polydispersity index (PDI) of 0.21.*

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29 **Supplementary Figure 3**

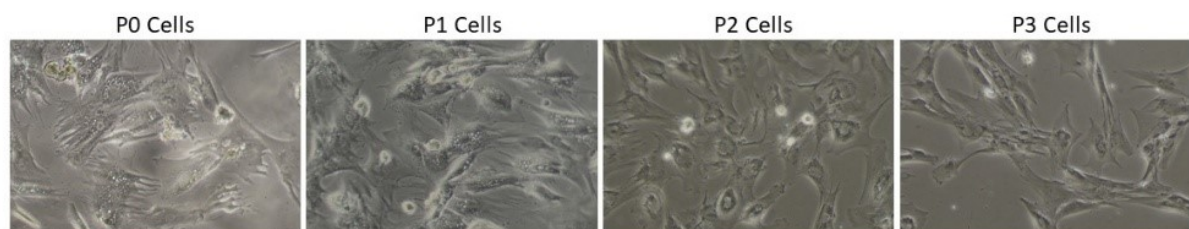


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31 *Supplementary Figure 3: AFM height profiles of ai. AuNPs showing low surface roughness and*
32 *particle heights of 5.8–6.0 nm, maxima ~10.9 nm, and aii. AuNPs-mAbs demonstrating*
33 *increased surface height (17–23 nm, maxima ~49.8 nm) and roughness due to antibody layers.*

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35 **Supplementary Figure 4**



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37 *Supplementary Figure 4: Representative microscopic images of MSCs after each passage from*
38 *P0 to P3 demonstrated consistent cell morphology across multiple passages.*

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