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Pan Wang, Hengjia Zhu, Jinxin Liu, Yue Ma, Juntong Yao, Xiaohui Dai, Jianming Pan

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Double Affinity Integrated MIPs Nanoparticles for Specific Separation of Glycoproteins: A Combination of Synergistic Multiple Bindings and Imprinting Effect

Pan Wang,[1] Hengjia Zhu,[1] Jinxin Liu, Yue Ma, Juntong Yao, Xiaohui Dai, Jianming Pan*

School of Chemistry and Chemical Engineering, Jiangsu University, Zhenjiang 212013, China

Abstract: The selective recognition, isolation, and subsequent enrichment of target glycoproteins are becoming more and more important in clinical diagnosis. In this work, nano-sized molecularly imprinted polymers integrated double affinity (i.e. metal ion affinity and boronate affinity) (D-MIPs) were prepared for specific separation of ovalbumin (OVA). Poly(styrene-glycidyl methacrylate) nanoparticles (PSG) with epoxy bonds were firstly grafted with iminodiacetic acid (IDA) by ring-opening reaction, and then the Cu^{2+} was chelated to prepare PSG/IDA-Cu^{2+}. Subsequently, imprinted OVA molecules were pre-immobilized through Cu^{2+} ion affinity. Finally, a surface imprinting layer was formed though the gentle self-oxidization of a kind of boronic acid ligand (i.e. 3-aminophenylboronic acid, APBA). By washing out imprinted molecules, as-prepared D-MIPs posed higher monolayer binding capacity (138.92 mg g^{-1}) and faster capture kinetics (30 min) for OVA, when compared with single affinity integrated MIPs (S-MIPs) and non-imprinted polymers (NIPs), and the chemical adsorption dominated double affinity was the rate-determining step for whole adsorption process. The imprinting

*Corresponding author. Tel.: +086 88791708; fax: +086 88791800.

E-mail: pjm@ujs.edu.cn (J.M. Pan)

1 The authors have equal contribution to this work.