

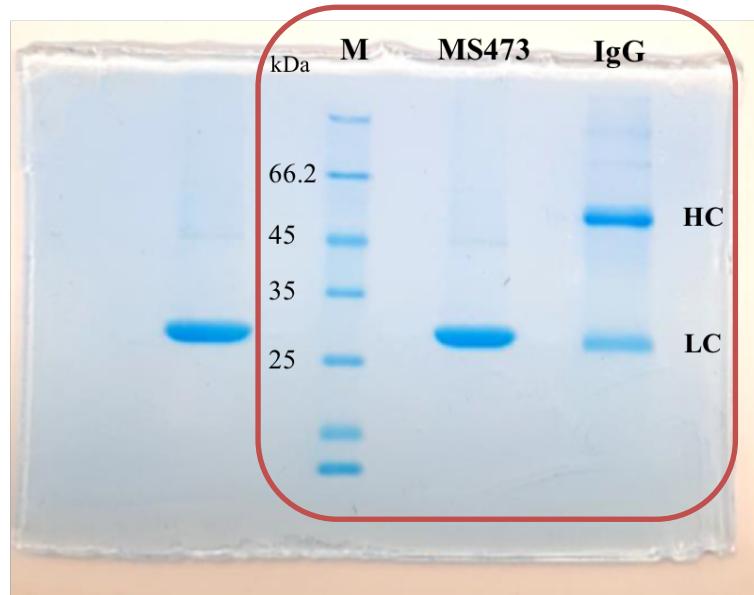
**Supplementary Fig. S1.** The expression of five soluble scFvs in *E. coli* HB<sub>2151</sub>. The expression of five scFvs, MS457, MS460, MS465, MS473, and MS475, in *E. coli* HB<sub>2151</sub>, was evaluated by (A) SDS-PAGE and (B) western blot analysis. (A) The expression level of MS457, MS460, MS465, MS473, and MS475 (~27 kDa) in the periplasmic extract of *E. coli* HB<sub>2151</sub> infected with the selected phagemids and the periplasmic extract of uninfected *E. coli* HB<sub>2151</sub> (control) induced by 0.1 mM IPTG were assessed by an SDS-PAGE gel (12 %). (B) A single band of the expected size (~27 kDa), related to the scFv, was detected by probing with mouse anti-human scFv polyclonal antibody, followed by goat anti-mouse IgG-horseradish peroxidase (HRP)-conjugated antibody. Lane M: pre-stained protein marker.

**CDR3** FR4 FR1  
 SSLRSEDTAYVYC/\*\*ELGKSPA\*\*\*DI //WGQATLATASSLE//GGGGSGGGSGGGAS//DIQMTQSPSSLSASVGDRVITICRVS

**CDR1** FR2                    **CDR2** FR3                    **CDR3** FR4  
 //QIG\*\*T//LNWYHQPGKVPKLLIS//SG\*V//SLQSGAPSFRSGSGSGTDFLTISSLQPEDFATYYC//K\*\*SLWV\*\*//FGGGTKVDIK

RAVAHHHHHH

### Supplementary Fig. S2. The amino acid sequence of MS473.



**Supplementary Fig. S3.** The purity of MS473 was evaluated by SDS-PAGE. A single protein band at approximately 27 kDa related to the purified scFv is seen on a 12% SDS-PAGE gel stained with Coomassie® blue. IgG: human immunoglobulin G, Lane M: unstained protein marker. The red box on the original SDS-PAGE denoted the region cropped for the Figure 3A shown in the manuscript.