# Multi-cyclic protein-protein interaction based on reversible binding between the cellulosomal component proteins

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The cellulosomal component proteins A and B of bacterial cellulosome were cloned from Clostridium thermocellum and expressed in active form with the fusion of tobacco mosaic virus coat protein and enhanced green fluorescent protein (EGFP), respectively, in Escherichia coli. The tobacco mosaic virus coat protein-A fusion protein was assembled to the stable and rod-shaped nanostructure under a particular buffer condition, where many active A proteins are biologically and densely immobilized around the 3-dimensional surface of tobacco mosaic virus coat protein-A rod. Using green fluorescent protein as a fluorescent reporter, we confirmed that the Ca+ 2-dependent native A-B binding and dissociation were reproduced between two recombinant fusion proteins, tobacco mosaic virus coat protein-A and EGFP-B. The multi-cyclic operation of binding-dissociation between tobacco mosaic virus coat protein-A rod and EGFP-B was successfully performed with maintaining the reversible A-B interaction in every cycle. Although fused to B protein as a proof-of-concept here, EGFP can be switched to other functional proteins/peptides that need to be used in multi-cyclic operation.