

Gene Reverse Transfection Mediated by Upright-Sheets Silica Network

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Abstract

Controlled and efficient gene delivery has gained significant attention over the past two decades. The conventional bulk transfection by different carriers¹ limited delivery efficacy due to extracellular and intracellular barriers. Recently, a new strategy termed reverse transfection or substrate-mediated delivery has proved to be able to improve these limitations.² We here developed a silica film composed by upright-sheets network for the substrate-mediated reverse gene transfection.³ Silica is one of the most frequently used inorganic materials and also a promising structural material for drug and gene delivery.⁴ The preparation of the silica film was based on a dissolution-regrowth process which makes the flat silica layer automatically change to nanosheets network on the surface. The silica film with dense upright sheet network showed high surface activity and surface area, which favoured the immobilization of DNA and subsequent cell transfection even without recombinant proteins. Transgene expression indicated that the transfection efficiency of the upright-sheets silica network was 2 times greater than the solution transfection. This silica film introduces possibilities for gene-anchored substrates or scaffolds for gene delivery as well as for tissue engineering applications.

References

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Figures

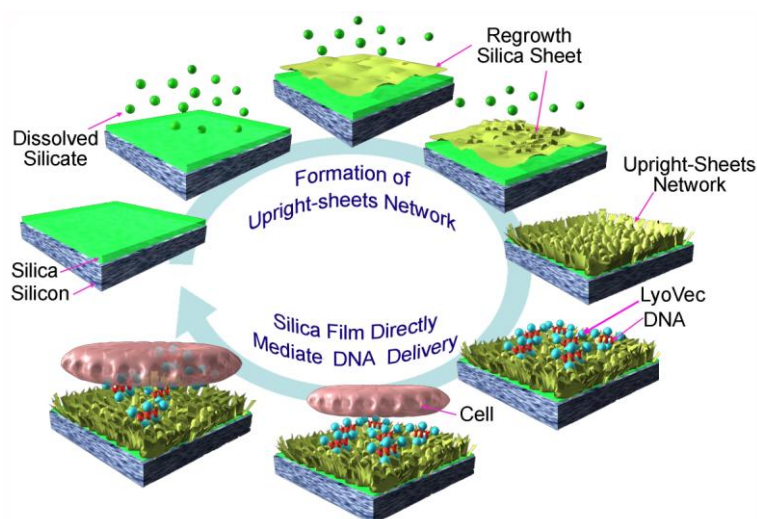


Figure 1. Scheme for the formation of silica film composed by upright-sheets network and the film mediated DNA delivery.