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## Electrochemically triggered release of drugs

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### ABSTRACT

The release of drugs in a controlled manner over long-term periods has been recognized as one of the most promising biomedical technologies for treatment of certain types of diseases. Medical conditions such as cancer, diabetes and chronic pain require medications that must be dosed intermittently on demand and over a long period of time. The use of an electrical signal is considered as an attractive way when drug delivery on demand is requested. The approach is simple, safe, and inexpensive and has a wide range of possibilities to trigger the release. Changing the bias of the applied potential, the current density, using continuous or pulsed conditions, negative or positive potential bias, short or long cycles all allow in a unique manner the on-demand release of drugs. Together with advances in nanotechnology, enabling the realization of miniaturized electrical systems and circuits on almost standard bases make electrically triggered drug release very appealing. While special attention has to be paid to the susceptibility of drugs to be oxidized/reduced, and influence of applied current on the behavior of cells and tissues, developments in materials science have taken these concerns into considerations. The state of the art of materials and films devoted for electrical and electrochemical activation will be presented in this review.

**Keywords:** drug release, electrical actuation, electrochemical release, polymers, graphene, nanocomposites, carbon-based materials.

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