

# Putrescine, Cadaverine, Spermine and Spermidine-Enhanced Precatalyst Preparation Stabilization and Initiation (EPPSI) Nano Molecules

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## Opinion

In the current study, we study Putrescine, Cadaverine, Spermine and Spermidine-Enhanced Precatalyst Preparation Stabilization and Initiation (EPPSI) Nano molecules incorporation into the Nano Polymeric Matrix (NPM) by immersion of the Nano Polymeric Modified Electrode (NPME) as molecular enzymes and drug targets for human cancer cells, tissues and tumors treatment under synchrotron and synchrocyclotron radiations. Putrescine is related to cadaverine (both polyamine). Both are produced by the breakdown of amino acids in living and dead organisms and both are toxic in large doses. Putrescine and cadaverine are largely responsible for the foul odor of putrefying flesh, but also contribute to the odor of such processes as bad breath and bacterial vaginosis. The polyamines, of which putrescine is one of the simplest, appear to be growth factors necessary for cell division. Putrescine apparently has specific role in skin physiology and neuroprotection. Spermine is a polyazaalkane that is tetradecane in which the carbons at positions 1, 5, 10 and 14 are replaced by nitrogens. Spermine has broad actions on cellular metabolism. It has a role as an antioxidant, an immunosuppressive agent and a fundamental metabolite. It is found in a wide variety of organisms and tissues and is an essential growth factor in some bacteria. It is found as a polycation at all pH values. Spermine is associated with nucleic acids, particularly in viruses, and is thought to stabilize the helical structure. Putrescine originates in putrefying and rotting flesh, and is quite literally, the smell of death. It is one of the breakdown products of some of the amino-acids found in animals, including humans. Although the molecule is a poisonous solid, as flesh decays the vapor pressure of the Putrescine it contains becomes sufficiently large to allow its disgusting odour to be detected. It is usually accompanied by Cadaverine (named after the cadavers that give rise to it), a poisonous syrupy liquid with an equally disgusting smell. Putrescine and Cadaverine also contribute towards the smells of some living processes. Since they are both poisonous, the body normally excretes them in whatever way is quickest and most convenient. For example, the odour of bad breath and urine are 'enriched' by the presence of these molecules, as is the 'fishy' smell of the discharge from the female medical condition bacterial vaginosis. PEPPSI is an abbreviation for pyridine-nhanced precatalyst preparation stabilization and initiation. In comparison to many alternative palladium catalysts, PEPPSI-type complexes are stable to air and moisture and are

relatively easy to synthesize and handle. In this work, the term Enhanced Precatalyst Preparation Stabilization and Initiation (EPPSI) is used. In the basic structure of PEPPSI, R can be a methyl (CH<sub>3</sub>, Me), ethyl (C<sub>2</sub>H<sub>5</sub>, Et), isopropyl (C<sub>3</sub>H<sub>7</sub>, iPr), isopentyl (C<sub>5</sub>H<sub>11</sub>, iPent), or isoheptyl (C<sub>7</sub>H<sub>15</sub>, iHept) group, and the resulting catalysts are thus labeled as PEPPSI-IMes, PEPPSI-IET, PEPPSI-IPr, PEPPSI-IPent, and PEPPSI-IHept respectively, with or without "Pd-" added in front. Contrary to common palladium-based catalysts, such as tetrakis(triphenylphosphine)palladium(0), PEPPSI is stable to exposure to air and moisture. Even heating in dimethyl sulfoxide at 120°C for hours does not result in significant decomposition or neutralization of PEPPSI catalysts. PEPPSI can catalyze various palladium cross-coupling reactions including Negishi coupling, Suzuki coupling, Sonogashira coupling, Kumada coupling, and the Buchwald-Hartwig amination as well as the Heck reaction. In Negishi coupling, PEPPSI promotes reaction of alkyl halides, aryl halides or alkyl sulfonates with alkylzinc halides and the important advantage of PEPPSI over alternative catalysts is that the reaction can be carried out in a general chemical laboratory, without a glove box. PEPPSI contains palladium in the +2 oxidation state and is thus a "precatalyst", that is the metal must be reduced to the active Pd(0) form in order to enter the cross-coupling catalytic cycle. Putrescine and Cadaverine also contribute to the distinctive smell of semen, which also contains the related molecules Spermine and Spermidine. In this regard, the development of Chemical Modified Electrodes (CEMs) is at present an area of great interest. CEMs can be divided broadly into two main categories; namely, surface modified and bulk modified electrodes. Methods of surface modification include adsorption, covalent bonding, attachment of polymer Nano films, etc. Polymer Nano film coated electrodes can be differentiated from other modification methods such as adsorption and covalent bonding in that they usually involve multilayer as opposed to monolayer frequently encountered for the latter methods. The thicker Nano films imply more active sites which lead to larger analytical signals. This advantage coupled with other, their versatility and wide applicability, makes polymer Nano film modified electrodes particularly suitable for analytical applications. On the other hand, it has been shown that, macrocyclic complexes of Putrescine, Cadaverine, Spermine and Spermidine-Enhanced Precatalyst Preparation Stabilization and Initiation (EPPSI) Nano molecules-encapsulating Carbon nanotubes are interest as modifying agents because in basic media Putrescine, Cadaverine, Spermine and Spermidine-Enhanced Precatalyst Preparation Stabilization and Initiation (EPPSI) Nano molecules-encapsulating Carbon nanotubes redox centers show high catalytic activity towards the oxidation of small organic anti-cancer Nano compounds. The high-valence species of Putrescine, Cadaverine, Spermine and Spermidine-Enhanced Precatalyst Preparation Stabilization and Initiation (EPPSI) Nano molecules-encapsulating Carbon nanotubes seem to act as strong oxidizing agents for low electroactivity organic substrates. 1,2-Dioxetane (1,2-Dioxacyclobutane), 1,3-Dioxetane (1,3-Dioxacyclobutane), DMDM Hydantoin and Sulphobate as the anti-cancer organic intermediate products of methanol oxidation as well as formic acid, is important to investigate its

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electrochemical oxidation behavior in Putrescine, Cadaverine, Spermine and Spermidine-Enhanced Precatalyst Preparation Stabilization and Initiation (EPPSI) Nano molecules-encapsulating Carbon nanotubes incorporation into the Nano Polymeric Matrix (NPM) by immersion of the Nano Polymeric Modified Electrode (NPME) as molecular enzymes and drug targets for human cancer cells, tissues and tumors treatment under synchrotron and synchrocyclotron radiations. Modified polymeric Multi-Walled Carbon Nanotubes (MWCNTs) paste electrode toward the electrocatalytic treatment of human cancer cells, tissues and tumors under synchrotron and synchrocyclotron radiations in alkaline medium at ambient temperature was investigated [1-20].

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