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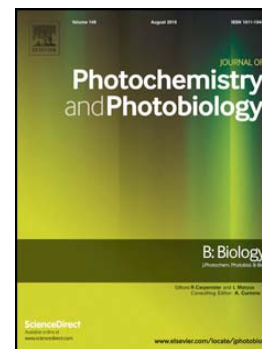
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Laser Assisted Anticancer Activity of Benzimidazole Based Metal Organic Nanoparticles

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Abstract

Recent studies showed that the photothermal therapy can be effectively used for the targeted cancerous cells destruction. Hence, in the present study, two benzimidazole based metal organic complex nanoparticles, dichloro cobalt(II) bis-benzimidazole (Co-BMZ) and dichloro copper(II) bis-benzimidazole (Cu-BMZ), were synthesized by reprecipitation method and their anti-cancer activity by means of photothermal effect has been studied. Transmission electron microscopy analysis shows that the particle size of Cu-BMZ is ~ 100 nm and Co-BMZ is in the range between 100 and 400 nm. Zeta potential analysis ensures the stability of the synthesized nanoparticles. It is found that the nonlinear absorption of the nanoparticles increases with increase in laser power intensity. Phototoxicity of human lung cancer (A549) and the normal mouse embryonic fibroblast (NIH/3T3) cells was studied using a 650 nm laser. Even though both the cell lines were affected by laser irradiation, A549 cells show higher cell destruction and lower IC_{50} values than the normal cells. Docking studies were used to analyse the interaction site and the results showed that the Cu-BMZ molecules have higher dock score than the Co-BMZ molecules. The obtained results indicate that Cu-BMZ samples have lesser particle size, higher nonlinear absorption and higher interaction energy than the Co-BMZ samples.

Keywords: Photothermal therapy; Nonlinear absorption; Laser; Cancer

1 Introduction

Cancer is one of the deadlier diseases that accounts for millions of death every year. In 2016, it is estimated that 1,685,210 new cases are diagnosed with cancer and it caused

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