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Synchrotron studies of chemotherapy drugs and their interactions; a novel application for graphene?

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Chemotherapy treatment usually involves the delivery of fluorouracil (5-Fu) together with other drugs through central venous catheters. Catheters and their connectors are increasingly treated with silver or argentic alloys/compounds. Complications arising from broken catheters are common, leading to additional suffering for patients and increased medical costs. Here, we use synchrotron techniques (PES and NEXAFS) to uncover a likely cause of such failure. We study the surface chemistry relevant to chemotherapy drug delivery, i.e. between 5-Fu and catheter materials. We show that silver catalytically decomposes 5-Fu, compromising the efficacy of the chemotherapy treatment. Furthermore, HF is released as a product, which will be damaging to both patient and catheter. We demonstrate that graphene surfaces inhibit this undesirable reaction and would offer superior performance as nanoscale coatings in cancer treatment applications.

Keywords

Chemotherapy, Graphene, Photoemission, NEXAFS, surface chemistry

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