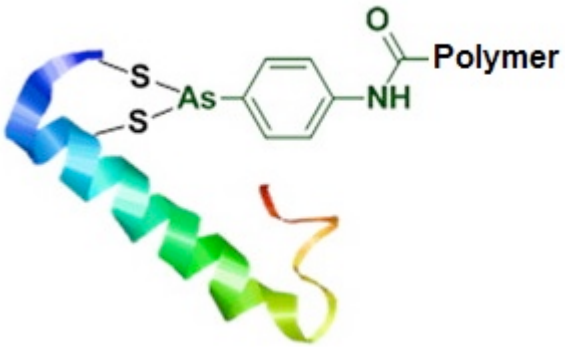
Linking Biomolecules and Polymers using Arsenic

Arsenic can be used to couple polymers to biomolecules in an efficient and highly specific way, researchers within the Monash-Warwick alliance have recently reported in the prestigious Journal of the American Chemical Society.

Although arsenic is mostly in the news as a poison, for example in a recent law case about wine with high levels of arsenic in California, its use as a drug dates back millennia as a common ingredient in Chinese medicine. In the early 20th century, Nobel-laureate Paul Ehrlich developed several arsenic containing compounds for diseases including syphilis and cancer. And it is presently the standard of treatment for a specific form of leukemia.



Large biomolecules, such as proteins and peptides, can be used as a drug to treat various diseases. In the last decades, scientists have developed several methods to modify these large molecules with synthetic materials, such as polymers, to improve their efficacy. But, the methods are still limited compared to the sophisticated modifications by nature.

In the recent study, the first example of using organic arsenicals to couple polymers to large biomolecules was reported. The arsenic compound interacts with the so-called disulphide bridges within the molecule. This new coupling method has a high specificity and selectivity, with a negligible toxicity. The authors say that the new method can also be used for drug release due to its reversible nature and hope that the enhanced specificity can benefit the drug delivery community in the future design of biomaterials.

P. Wilson, et al. Journal of the American Chemical Society 03/2015; 137:4215-4222.
DOI:10.1021/jacs.5b01140