Arylazopyrazole Molecular Photo-Switches with Potential Biological Applications

Jewel Harper, Ivana Thigpen and *Kesete Ghebreyessus,* Department of Chemistry and Biochemistry, Hampton University, Hampton, VA 23668.

Arylazopyrazoles (**AAPs**) have emerged as the next generation of photoactive switches with versatile scaffolds and show significant potential for biological applications. For these applications, the properties of **AAPs** molecular switches need to be improved by altering their structures through the introduction of specific substituents. Herein, the synthesis and characterization of the 1,8-naphthalimide conjugated with arylazopyrazole-based molecular photoswitches is reported. 1,8-naphthalimide is a known bioactive molecule endowed with DNA intercalating and significant photoinduced DNA cleavage properties, and its combination with the photoactive **AAP** unit may lead to compounds with unique DNA binding profiles and enhanced antitumor activity. The new compounds, which bear an **AAP** moiety, can be efficiently and reversibly interconverted between the trans and cis configurations, resulting in changes in anticancer activities upon different wavelengths of light exposure. To elucidate their optical properties, the effect of substituents on the photo-isomerization process were explored using UV-vis spectroscopy. Upon irradiation with alternating UV and green light, the compounds undergo efficient reversible *trans* to *cis* photoisomerization of the azopyrazole unit. The results show that the photoisomerization behavior of the other compounds is significantly influenced by substiuents at the ortho and para positions. The **AAPs** with the ortho-thiomethyl substituent displayed efficient isomerization, while in the para-thiomethyl substituent was inhibited. Studies on their potential anticancer activities are currently underway.