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## Intellectual Property

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## Conjugates Useful for Single Molecule DNA Detection and/or Cleavage

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## Invention Description

DNA binding proteins play an important regulatory role in activating transcription. Both the study and the utility of such specific DNA binding proteins would be enhanced if the binding protein were able to report its binding state and some information about its environment. In addition, it would be useful if controlled activities, such as DNA cleavage, could be built into these systems.

ASU researchers have developed a technology that consists of peptide/dye conjugates useful for single molecule detection and/or cleavage of specific DNA sequences. The dye is fluorescent only when the conjugate is in the bound state and essentially non-fluorescent when in the unbound state. Once the peptide/dye conjugates are bound, administering light triggers the cleavage of the specific DNA sequence. For example, one of the novel conjugates targets a 5' - TGTTCT - 3' sequence at concentrations in the nanomolar range. The DNA binding characteristics of this conjugate have specifically been confirmed at the single molecule level. The probe recognizes the DNA specific sequence found in the native glucocorticoid receptor and binds tightly with a dissociation constant of roughly 20nM.

## Potential Applications

- These Peptide/dye conjugates are very useful and are amenable to many applications including:
  - DNA Sequence Identification – for many uses including: genetic mapping, abnormality testing, etc.
  - DNA Sequence-specific photo-cleavage
  - Molecular mimics of regulatory DNA binding proteins – there is growing interest in the design of molecular mimics of the DNA binding regions of certain regulatory proteins responsible for moderation of specific genetic functions
  - Basic Research

## Benefits and Advantages

- This molecule detection technology offers several benefits:
  - Sensitive Detection – Identifies DNA sequences at very low concentrations
  - Highly Specific Probing – peptide will only bind to a specific sequence
  - High Signal to Noise Ratio – since the dye only fluoresces when the conjugate is bound, background noise is reduced
  - No Amplification – Technology does not require use of PCR