Product Specifications

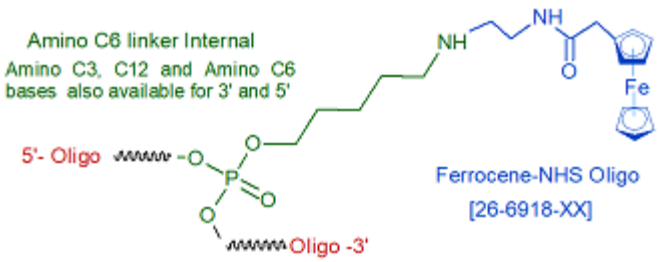
Custom Oligo Synthesis, antisense oligos, RNA oligos, chimeric oligos, Fluorescent dyes, Affinity Ligands, Spacers & Linkers, Duplex Stabilizers, Minor bases, labeled oligos, Molecular Beacons, siRNA, phosphonates Locked Nucleic Acids (LNA); 2′-5′ linked Oligos

Oligo Modifications

For research use only. Not for use in diagnostic procedures for clinical purposes.

Ferrocene-NHS

Category	Redox Electrochemical
Modification Code	Fc-N
Reference Catalog Number	26-6918
5 Prime	Y
3 Prime	Y
Internal	Y
Molecular Weight(mw)	694.53



This modification is a post synthesis conjugation to a primary amino group thus an additional modification with an amino group is required. A C3, C6 or C12 amino group can be placed at the 5' or for the 3' end a C3 or C7 amino and for internal positions an amino modified base is used, e.g Amino dT C6.

Yield of Post Synthesis NHS, Maleimide & Click Ligand Conjugation* Oligo Scale of Synthesis Yield, nmols 50 nmol 2 nmol 200 nmol 5 nmol 1 umol 16 nmol 2 umol 30 nmol 5 umol 75 nmol 10 umol 150 nmol 15 umol 225 nmol * The yield will be lower for oligos longer than 50mer. Click here for yield table of long oligos. * Click here for RNA Oligos scale of synthesis and yield. **NHS Ligand conjugation** requires a primary amino group. Gene Link offers a wide selection of amino modifications for 5', 3' and internal sites. Click here for a list of conjugation chemistry modifications. **Maleimide Ligand conjugation** requires a thiol group. Gene Link offers a wide selection of thiol modifications for 5', 3' and internal sites. Click here for a list of conjugation chemistry modifications.

Click Chemistry Ligand conjugation requires a corresponding Click modification; examples Alkyne:Azide, Azide:DBCO, BCN:Azide, BCN: TCO:Tetrazine. Gene Link offers a wide selection of click modifications for 5', 3' and internal sites. Click here for a list of click chemistry modifications.

Ferrocene oligonucleotides should be stored under Argon and aqueous solutions should be degassed immediately. A convenient way to degas is the use of vacuum desiccator. We suggest making multiple small aliquots for storage at -20C or -80C for long term storage.

Ferrocene is a redox-active ferrocene moiety. Ferrocene is a sandwich compound composed of two cyclopentadienyl rings bound on opposite sides of a central iron atom (1). When incorporated into an oligonucleotide, the presence of ferrocene enables its use as an electrochemical (EC) probe for nucleic acid analysis. Ferrocene-modified probes can be designed to bind to either single- or double-stranded targets, and the resulting double- or triple-stranded probe-target complex is typically detected by HPLC with a standard electrochemical detector, with reported sensitivity at the sub-femtomole level (2,3). Ferrocence-modified probes covalently attached to a gold electrode surface have also been used in EC-based SNP assay, one probe to detect wild-type, and the other the SNP (4). In an alternative format, a "sandwich SNP assay" has also been studied. Here, a capture oligo was covalently bound to a gold surface via several phosphorothiolate linkages to capture the desired target DNA and hold it close to the gold surface. The targeted region for the capture oligo contains the SNP. A second, ferrocene-modified detection probe, hybridizes to a different, highly conserved, part of the target oligo to serve as the detector. If the target has been captured, electron transfer occurs between the ferrocene of the detection probe and the gold surface, producing an electrochemical signal (5). Ferrocene-modified DNA aptamers, designed to bind to one specific biochemical target molecule (DNA, RNA, proteins, etc.) have also been used to make aptamer-based EC sensors (6). EC probes also have significant potential as a low cost alternative to fluorescent-based probes in DNA microarray systems designed for use in clinical or medical diagnosis (7,8).

-

References

1. Neto, F., Pelegrino, A., Caramori, A., Darin, V.A. Ferrocene: 50 Years of Transition Metal Organometallic Chemistry—From Organic and Inorganic to Supramolecular Chemistry. *ChemInform* (2004), **35**: no. doi: 10.1002/chin.200443242.
2. Takenaka, S., Uto, Y., Kondo, H., Ihara, T., Takagi, M. Electrochemically active DNA probes: Detection of target DNA sequences at femtomole level by high-performance liquid chromatography with electrochemical detection. *Anal. Biochem.* (1994), **218**: 436-443.
3. Ihara, T., Maruo, Y., Takenaka, S., Takagi, M. Ferrocene-oligonucleotide conjugates for electrochemical probing of DNA.*Nucleic Acids Res.* (1996), **24**: 4273-4280.
4. Yu, C.J., Wan, Y., Yowanto, H., Li, J., Tao, C., James, M.D., Tan, C.L., Blackburn, G.F., Meade, T.J. Electronic Detection of Single-Base Mismatches in DNA with Ferrocene-Modified Probes. *J. Am. Chem. Soc.* (2001), **123**: 11155-11161. 5. Nakayama, N., Ihara, T., Nakano, K., Maeda, M. DNA sensors using a ferrocene-oligonucleotide conjugate. *Talanta* (2002), **56**: 857-866.
6. Radi, A-E., Sanchez, J.L.A., Baldrich, E., O'Sullivan, C.K. Reagentless, Reusable, Ultrasensitive Electrochemical Molecular Beacon Aptasensor. *J. Am. Chem. Soc.* (2006), **128**: 117-124.
7. Liepold, P., Wieder, H., Hillebrandt, H., Friebel, A., Hartwich, G. DNA-arrays with electrical detection: A label-free low cost technology for routine use in life sciences and diagnostics.*Bioelectrochem.* (2005), **67**: 143-150.
8. Liepold, P., Kratzmuller, T., Persike, N., Bandilla, M., Hinz, M., Wieder, H., Hillebrandt, H., Ferrer, E., Hartwich, G. Electrically detected displacement assay (EDDA): a practical approach to nucleic acid testing in clinical or medical diagnosis. *Anal. Bioanal. Chem.* (2008), **391**: 1759-1772.