Supplementary information:

Materials:
All the solvents and reagents for peptide synthesis were purchased from IRIS Biotech GmbH (Marktredwitz, Germany). The reagents acryloyl chloride and triethylamine were purchased from Sigma-Aldrich Company (St. Louis,USA). Four-armed polyethylene glycol (Mn = $10.0x10^3$; PDI = 1.09) was purchased from PolymerSorurce (Montreal, Canada). All the reagents were used as it is, without preliminary purifications.

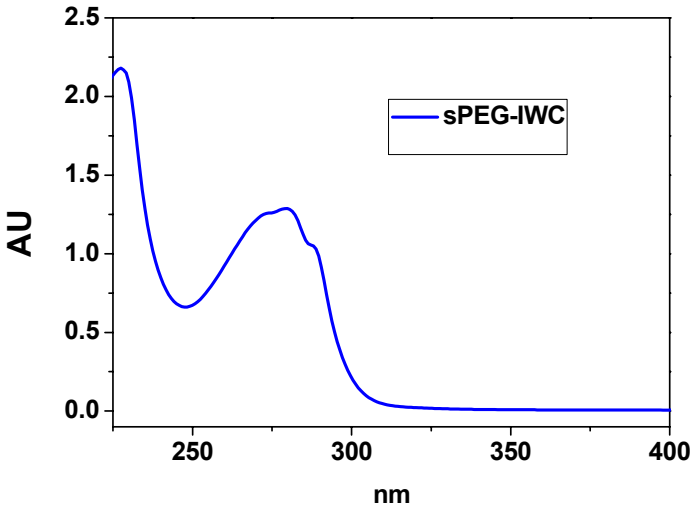
Peptide synthesis:
All peptides were synthesized using solid-phase methods on an Activo P11 (Activotec, UK) peptide synthesizer by standard Fmoc-chemistry. The 0.25 mmol scale protocol with a C-terminal capping protection strategy by amide was used. Activation was achieved by O-(Benzotriazol-1-yl)-N,N,N',N'-tetramethyluronium tetrafluoroborate (TBTU), and 1-hydroxybenzotriazole (HOBt) in DMF. Deprotection of the amino acid side chains and cleavage from the resin was performed by reaction with a mixture of trifluroacetic acid (TFA) (85% v/v), phenol (5% v/v), dithiothreitol (DTT) (2.5% v/v), *tri*-isopropyl silane (TIPS) (2.5% v/v) and water (5% v/v) for 2.5 hours at room temperature. The crude peptide was then precipitated in cold anhydrous diethyl ether, collected by vacuum filtration and dried under vacuum. Final purification was achieved by preparative reversed-phase HPLC.

Analytical high performance liquid chromatography (HPLC):
HPLC experiments were performed by analytical HPLC XBridge BEH 300 C-18 column (5μM particle size, 2.1×250 mm, Waters, USA) over 40 min using the flow rate of 0.5 ml/min for the analytical column. A linear gradient of water/acetonitrile containing 0.1 % (v/v) trifluroacetic acid was used as the mobile phase. For HPLC separations, the monitoring wavelengths were set a wavelength range of 210-278 nm. A two-pump system (Agilent Technologies 1200 Series) equipped with a UV/Vis detector/spectrophotometer having a 1-cm path length cell was used.

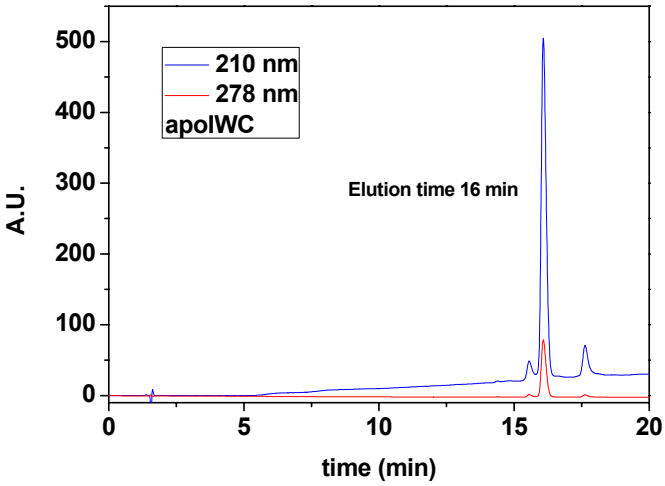
Analytical high performance size exclusion chromatography (HPSEC):
HPSEC experiments were performed on BioSep-SEC-S 2000 column (Phenomenex, USA) The peptide samples were eluted using 50 mM KH2PO4/ 100 mM KCl, pH7, with 0.2-0.4 ml/min flaw rate, and monitored at a wavelength range of 210-278 nm. To keep reproducibility of the results, purification of the columns using DMSO was performed after each 20-30 runs. A two-pump system (Agilent Technologies 1200 Series) equipped with a UV/Vis detector/spectrophotometer having a 1-cm path length cell was used.

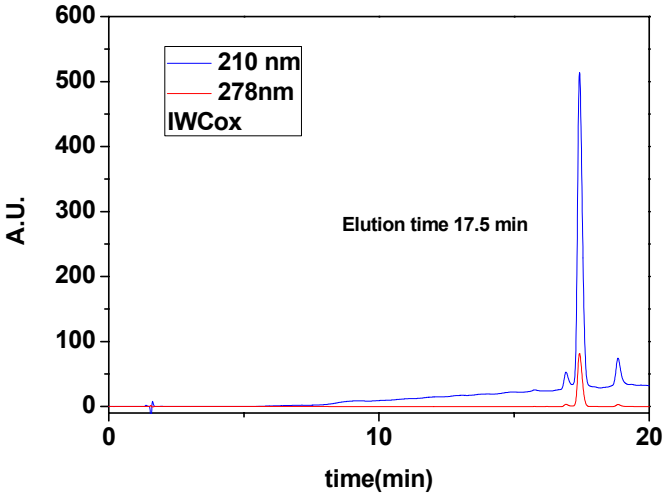
Electrospray ionization mass spectrometry (ESI-MS):
All ESI-MS measurements were performed on Mariner spectrometer (Applied Biosystems, USA) equipped wit a syringe pump. Nitrogen was used as nebulizing and desolvation gas.

UV-Vis spectra of sPEG-IWC conjugate:

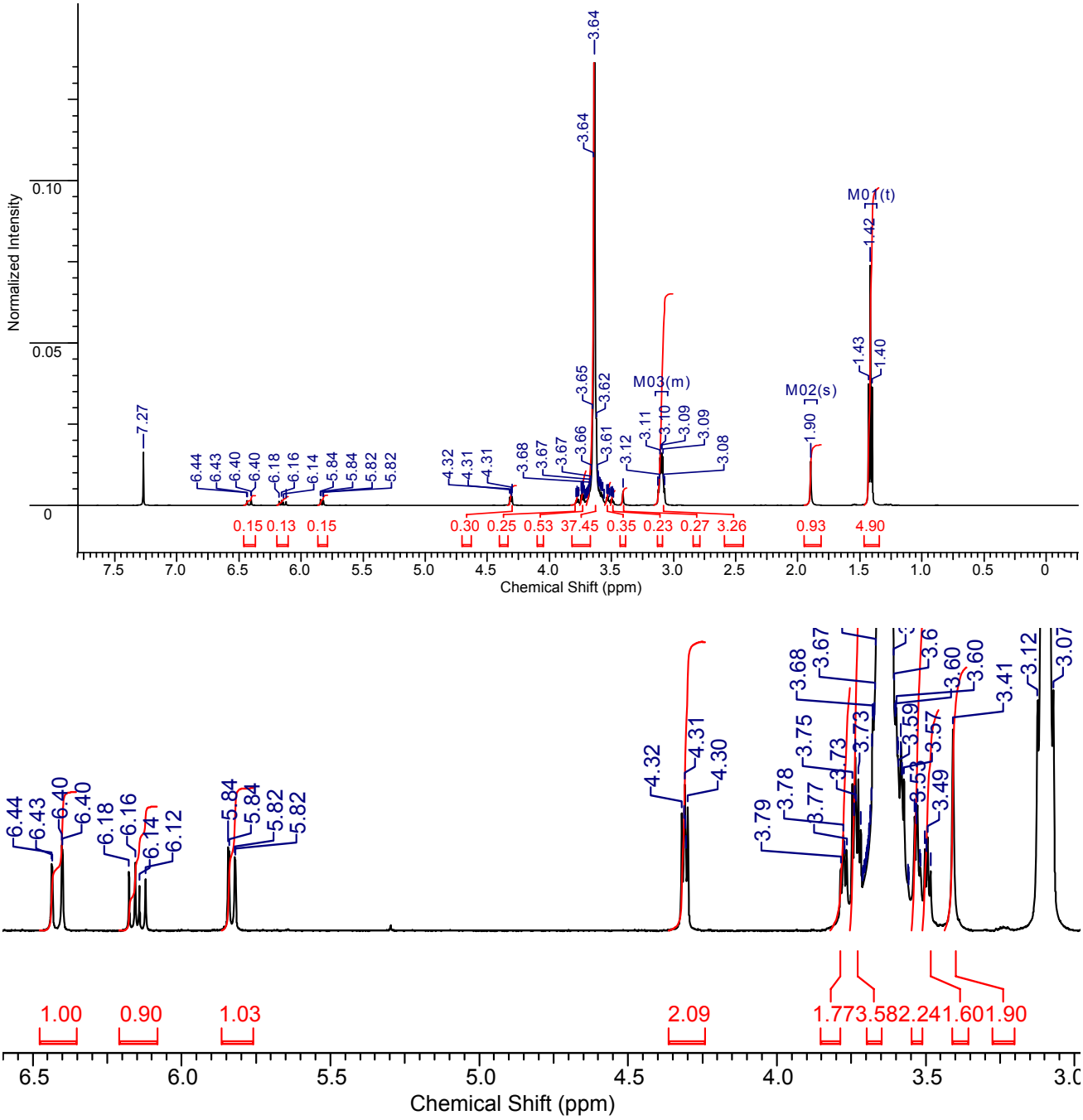


HPLC apoIWC and IWC oxidized by air (IWCox):

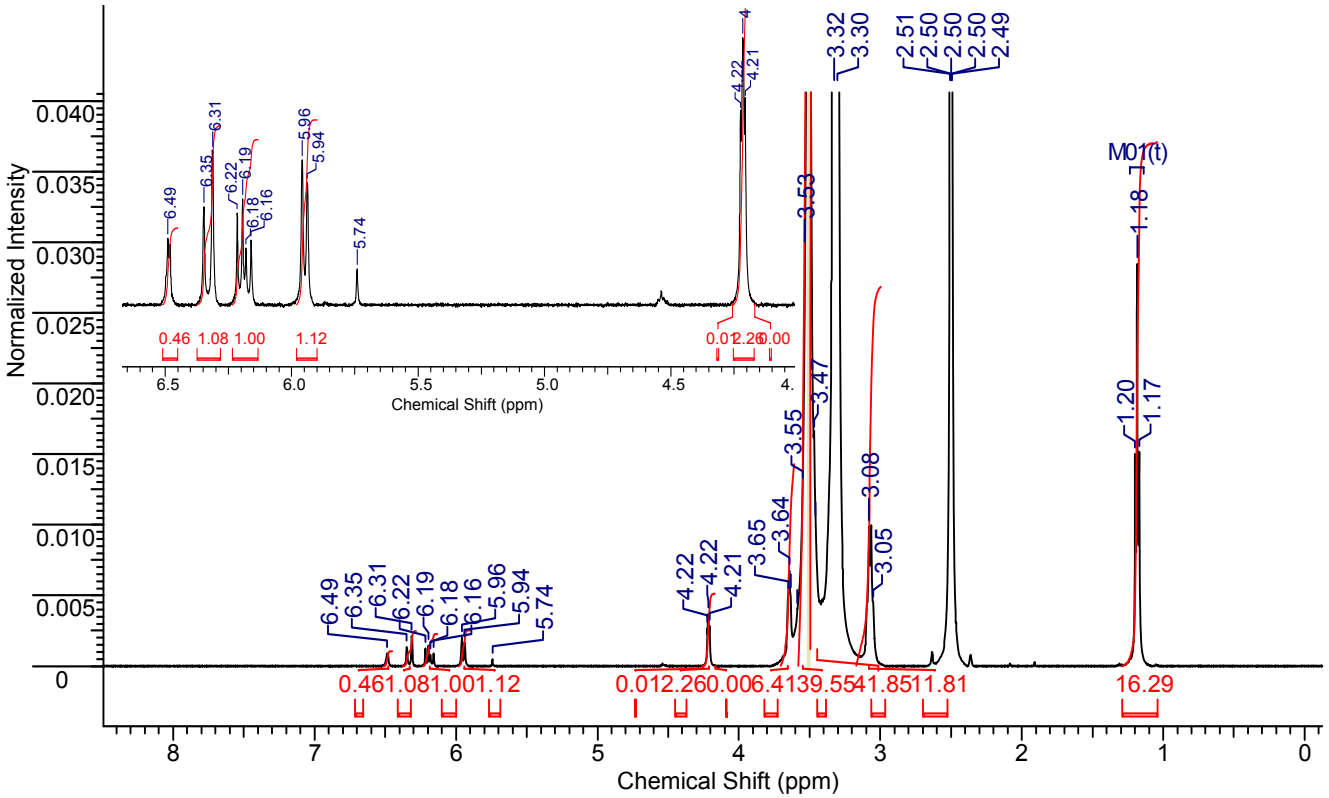




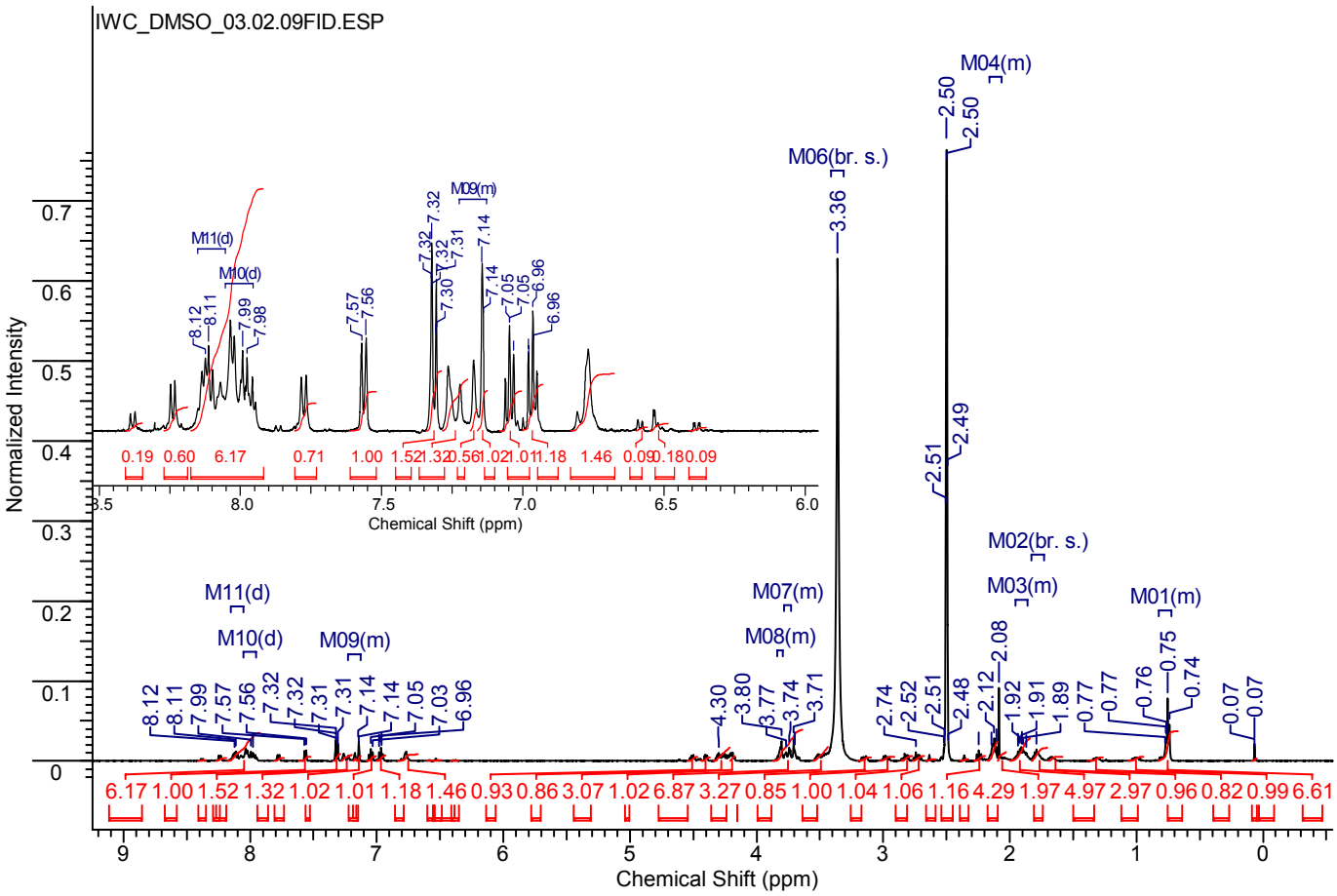
NMR spectra of star sPEG-Acl in chloroform:



NMR spectra of apopeptide sPEG-Acl in DMSO:



NMR spectra of apopeptide IWC in DMSO:



NMR spectra of sPEG-IWC conjugate in DMSO: