In this chapter, we are presenting a highly fluorescent sensor S5 which is the open chain version of S4 at rhodanine reported in chapter IV. The same showed selective fluorescent quenching with Cu$^{2+}$ followed by its fluorescent turn on response with cysteine without any interference even with glutathione (GSH) and homo cysteine (Hcy). Detail mechanistic aspects of above sensing have been unravelled through single crystal X-ray diffraction, ESI-mass determination as well as theoretical calculations through DFT. The S5 exhibited “on-off-on” switching behaviour towards Cu$^{2+}$ and Cys. The same was consequently used as input to build up an implication (IMP) logic gate by monitoring the output signal at ~520 nm. The S5 was further exploited for successful bio-imaging of Cu$^{2+}$ and Cys through fluorescence microscopy in E. coli cells.