INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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Thesis Title: Illuminating 4-Hydroxy-2*H*-chromene-2-thione: A Pioneer to the Development of Novel Heterocycles with Potent Biomedical Applications

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SHORT ABSTRACT

The contents embodied in this thesis are divided into six chapters, including an introductory chapter, based on experimental results obtained during the research period.

The introduction **Chapter I** provides a concise background, rationale and overview towards origin of this research work which includes the reason of choosing the core molecule, i.e., 4-Hydroxy-2*H*-chromene-2-thione that opens new avenues in heterocyclic chemistry and bioactive molecule design. In addition to this, this chapter also provides a brief overview of this research work. **Chapter II,** describes the synthesis of 3-Sulfenylindole derivatives from 4-hydroxy-2*H*-chromene-2-thione and indole using oxidative cross dehydrogenative coupling reaction and anti-proliferative activity study of some of their sulfone derivative. **Chapter III**, includes regioselective synthesis of 3-benzoyl-4-phenyl-4*H*,5*H*-thiopyrano[2,3-*b*]chromen-5-one derivatives through one-pot domino reaction using aromatic aldehyde, β-enaminone and 4-Hydroxy-2*H*-chromene-2-thione. **Chapter IV**, highlights the development of sulfur rich heterocycles *via* thioalkylation of 4-hydroxy-2*H*-chromene-2-thione into a one pot approach and *in-vitro* evaluation of some of the sulfones derivatives were carried out for antiproliferative activity studies. **Chapter V** was divided into two parts, **Chapter V-A** and **Chapter V-B**, in which both the part leads to the synthesis of hydrazones. The difference between these two chapters is that in **Chapter V-A,** environmentally benign synthesis of hydrazones were carried out through 4-hydroxy-2*H*-chromene-2-thione and 4-hydroxy-2*H*-thiochromene-2-thione with *tertiary* butyl nitrite and aromatic amines. In addition to this the reactivity pattern of our core molecule (4-Hydroxy-2*H*-chromene-2-thione) was studied along with quantum chemical analysis. Additionally, in **Chapter V-B,** hydrazone derivatives were synthesized through L-Proline catalyzed coupling reaction of aryl diazonium tetrafluoroborate with 4-Hydroxycoumarin. **Chapter VI** serves as the concluding chapter, integrating the key findings from all the previous chapters and highlighting the overall contributions of this research. Each of these chapters comprises several subsections, which include an introduction, previous work, present work, results and discussion, conclusions, experimental section, references, characterization data, and a few representative spectra.