

# UNIVERSITY OF NORTH BENGAL

Accredited by NAAC with Grade A

## DEPARTMENT OF PHYSICS

P.O. NORTH BENGAL UNIVERSITY  
RAJA RAMMOHUNPUR, DIST. DARJEELING,  
WEST BENGAL, PIN 734013,  
INDIA



ENLIGHTENMENT TO PERFECTION

Railway Station: New Jalpaiguri  
Nearest Airport: Bagdogra  
Phone: +91-(0) 353-2776338  
Fax: +91-(0) 353-2699001  
Website: www.nbu.ac.in

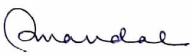
Ref. No. ....

Date : .....

## CERTIFICATE

I certify that Mr. Debarghya Goswami has prepared the thesis entitled "STUDIES ON SOME BIPHENYL BENZOATE BASED CHIRAL LIQUID CRYSTAL COMPOUNDS" for the award of Ph. D degree (science) in Physics of University of North Bengal under my guidance and supervision. He has carried out the work at the Department of Physics, University of North Bengal.

Date: 10.02.2020  
Place: NBU

  
PROF. PRADIP KUMAR MANDAL  
Department of Physics  
University of North Bengal  
Raja Rammohunpur  
P.O: North Nengal University Campus  
Dist: Darjeeling, pin 734013, West Bengal

## Urkund Analysis Result

Analysed Document: Debarghya Goswami\_Physics.pdf (D63078381)  
Submitted: 1/28/2020 7:02:00 AM  
Submitted By: nbuplg@nbu.ac.in  
Significance: 4 %

### Sources included in the report:

<https://www.scirp.org/xml/19089.xml>  
[https://www.researchgate.net/publication/233319014\\_Direct\\_transition\\_from\\_the\\_SmA\\_phase\\_to\\_the\\_tilted\\_hexatic\\_phase\\_in\\_liquid\\_crystals\\_with\\_several\\_lactate\\_units](https://www.researchgate.net/publication/233319014_Direct_transition_from_the_SmA_phase_to_the_tilted_hexatic_phase_in_liquid_crystals_with_several_lactate_units)  
[https://www.researchgate.net/publication/257307116\\_Antiferroelectric\\_Liquid\\_Crystals\\_Smart\\_Materials\\_for\\_Future\\_Displays](https://www.researchgate.net/publication/257307116_Antiferroelectric_Liquid_Crystals_Smart_Materials_for_Future_Displays)  
[https://www.researchgate.net/profile/Ravindra\\_Dhar/publication/232873686\\_Dielectric\\_Spectroscopy\\_of\\_a\\_Newly\\_Synthesized\\_Chlorinated\\_Analogu\\_e\\_of\\_MHPOBC\\_Antiferroelectric\\_Liquid\\_Crystals/links/02e7e527bc17febf7f000000.pdf?inViewer=true&disableCoverPage=true&origin=publication\\_detail](https://www.researchgate.net/profile/Ravindra_Dhar/publication/232873686_Dielectric_Spectroscopy_of_a_Newly_Synthesized_Chlorinated_Analogu_e_of_MHPOBC_Antiferroelectric_Liquid_Crystals/links/02e7e527bc17febf7f000000.pdf?inViewer=true&disableCoverPage=true&origin=publication_detail)  
[https://www.researchgate.net/publication/233475132\\_Ferroelectric\\_behaviour\\_of\\_hexatic\\_phases](https://www.researchgate.net/publication/233475132_Ferroelectric_behaviour_of_hexatic_phases)  
[https://www.researchgate.net/publication/312080349\\_Synthesis\\_and\\_characterization\\_of\\_new\\_homologous\\_series\\_of\\_unsymmetrical\\_liquid\\_crystalline\\_compounds\\_based\\_on\\_chalcones\\_and\\_3\\_5-disubstituted\\_isoxazoles](https://www.researchgate.net/publication/312080349_Synthesis_and_characterization_of_new_homologous_series_of_unsymmetrical_liquid_crystalline_compounds_based_on_chalcones_and_3_5-disubstituted_isoxazoles)  
[https://www.researchgate.net/profile/Praveen\\_Malik\\_Assistant\\_Professor/publication/216294747\\_Dielectric\\_spectroscopy\\_of\\_a\\_high-polarization\\_ferroelectric\\_liquid\\_crystal/links/066b0dcde018586fa48bb0aa.pdf?origin=publication\\_detail](https://www.researchgate.net/profile/Praveen_Malik_Assistant_Professor/publication/216294747_Dielectric_spectroscopy_of_a_high-polarization_ferroelectric_liquid_crystal/links/066b0dcde018586fa48bb0aa.pdf?origin=publication_detail)  
[https://www.researchgate.net/profile/Asim\\_Debnath2/publication/303514367\\_Maxwell\\_Wagner\\_and\\_Goldstone\\_mode\\_relaxations\\_in\\_a\\_oligomethyle\\_ne\\_spacer\\_based\\_ferroelectric\\_liquid\\_crystal/links/57480a3008ae2301b0b852cc.pdf?origin=publication\\_detail](https://www.researchgate.net/profile/Asim_Debnath2/publication/303514367_Maxwell_Wagner_and_Goldstone_mode_relaxations_in_a_oligomethyle_ne_spacer_based_ferroelectric_liquid_crystal/links/57480a3008ae2301b0b852cc.pdf?origin=publication_detail)  
de53e032-cdba-4cb7-b03e-ef54d00cf547  
ff306de3-3b41-4b6a-ae56-18864dd66a36  
57886672-939a-493d-b99d-08a8624f9704  
2c94b87a-4719-45cb-93f5-1d3fc491d416  
[https://www.researchgate.net/publication/303782738\\_Wide\\_range\\_room\\_temperature\\_ferroelectric\\_liquid\\_crystal\\_mixture\\_wi\\_th\\_microsecond\\_order\\_switching](https://www.researchgate.net/publication/303782738_Wide_range_room_temperature_ferroelectric_liquid_crystal_mixture_wi_th_microsecond_order_switching)  
<https://pubs.rsc.org/en/content/articlehtml/2016/ra/c6ra11238b>

[https://www.researchgate.net/publication/307550724\\_Induction\\_of\\_a\\_room\\_temperature\\_ferroelectric\\_SmC\\_phase\\_in\\_binary\\_mixtures\\_with\\_moderate\\_spontaneous\\_polarization\\_and\\_sub-millisecond\\_switching\\_time](https://www.researchgate.net/publication/307550724_Induction_of_a_room_temperature_ferroelectric_SmC_phase_in_binary_mixtures_with_moderate_spontaneous_polarization_and_sub-millisecond_switching_time)  
[https://www.researchgate.net/figure/Temperature-variation-of-relaxation-frequency-f-C-of-a-MIX0-b-MIX1-c-MIX2-and\\_fig2\\_326168305](https://www.researchgate.net/figure/Temperature-variation-of-relaxation-frequency-f-C-of-a-MIX0-b-MIX1-c-MIX2-and_fig2_326168305)  
[https://www.researchgate.net/publication/280528661\\_Formulation\\_Of\\_A\\_Room\\_Temperature\\_Ferroelectric\\_Liquid\\_Crystal\\_Mixture\\_With\\_Sub-millisecond\\_Switching\\_Time](https://www.researchgate.net/publication/280528661_Formulation_Of_A_Room_Temperature_Ferroelectric_Liquid_Crystal_Mixture_With_Sub-millisecond_Switching_Time)

Instances where selected sources appear:

61

*Alibarghya Goswami*  
10.02.2020

*Ramandeep*  
10.02.2020