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LINKAGE

Department of Chemistry, Yashwantrao Chavan College of Science, Karad

&

Department of Chemistry, Doodhsakhar Mahavidyalaya, Bidri

Linkage is signed on 5th January 2019 between **Department of Chemistry, Yashwantrao Chavan College of Science, Karad** (First Party) and **Department of Chemistry, Doodhsakhar Mahavidyalaya, Bidri** (Second Party). It is agreed by First party and Second party to impart student exchange, guest lectures, study tours, instrument training and research to the students and to organize conference/seminars jointly. Both the parties have discussed in detail the areas of co-operation and mutually agreed to make the linkage. Now it is agreed by and between both the parties with the following terms and conditions.

Terms and Conditions:

1) Both the parties will extend their facilities to each other in the areas of student exchange, guest lectures, study tours, instrument training and research to the students and to organize conference/seminars jointly.
2) No rental charges or any other incidental charges, unless mentioned, shall be paid by both the parties for using the infrastructure facilities of each other.
3) The linkage will be valid for a period of five years starting from the date of signing this agreement and may be renewed for a further period of five years through mutual consent of parties.
4) This linkage may be terminated by either side by giving a three months notice to that effect in writing.

In witness whereof, the parties here have set this hands on the 5th January 2019.

Party	**First Party**	**Second Party**
Institute	**Department of Chemistry, Yashwantrao Chavan College of Science, Karad**	**Department of Chemistry, Doodhsakhar Mahavidyalaya, Bidri**
Signature		
Name & Designation	Prof. (Dr.) S. H. Burungale Head, Department of Chemistry	Dr. S. N. Zende Head, Department of Chemistry
Seal	Yashwantrao Chavan College of Science ★ Karad ★ CHEMISTRY	DOODHSAKHAR MAHAVIDYALAYA ESTD. JULY 1990 BIDRI TAL. KAGAL ★ DIST. KOLHAPUR ★

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UV light-activated photocatalytic degradation of rhodamine B dye and Suzuki cross-coupling reaction by Ni ferrite catalyst synthesized by sol–gel auto-combustion method

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Abstract. Nanocrystalline nickel ferrite ($NiFe_2O_4$) was synthesized by economical sol–gel auto-combustion method. XRD pattern confirms existence of cubic spinel phase with average crystallite size of 28.37 nm. The magnetic and morphological properties of the sample were studied by using vibratory sample magnetometer (VSM) and scanning electron microscope (SEM), respectively. The prepared samples were used to study photocatalytic degradation of rhodamine B dye solution. The effect of UV light irradiation time, metal doping and kinetic parameters of photocatalysis with nickel ferrite catalyst was studied in detail. The catalyst was also utilized for a two-element coupling system of phenyl halide and phenyl boronic acid. The influence of solvent, temperature and metal loading of the catalyst was conjointly mentioned.

Keywords. Sol–gel auto-combustion; Photo catalyst; cross-coupling; magnetic properties.

1. Introduction

Recently, nanocrystalline ferrites have extensive interest due to their distinctive properties, such as electrical, magnetic and optical and wide applications in various technological fields. Nickel ferrite is of cubic spinel ferrimagnetic material that has attracted concentration of many researchers due to its large porosity at high frequency and high electrical trends. These materials have extensive applications in numerous fields like biomedical, microwave, magnetic media, ferrofluid, magneto-caloric refrigeration and gas sensors, etc. [1–8]. Semiconductor ferrites have distinctive magnetic, optical, electric and chemical properties and due to these properties, they are widely used for environmental application [9].

In inverse spinel-structured nickel ferrite ($NiFe_2O_4$), all divalent Ni^{2+} and half of trivalent Fe^{3+} cations occupy octahedral sites and rest of the trivalent at tetrahedral sites [10]. These semiconductor materials are chemically and thermally stable and hence, they are used in magnetic materials, pigments, catalysts, photo catalysts, drug delivery and resonance imaging (MRI) [11–13].

Nowadays, to fulfill increasing demand of our modem society there are increasing varieties of industries. Most of these industries directly dump their effluents into river and due to this, our society is facing increasing water, air and soil pollution. Some of the effluents from dye industries contain several dangerous consumable organic dyes like rhodamine B (RB). The RB is water soluble and when it enters the body of living organisms, it causes hazardous effects on them. Hence, purification of wastewater is essential due to contamination by bionutrients, organic, inorganic and microorganisms [14–17]. Metal oxide-catalysed cross-coupling reactions have flexible applications in organic synthesis [18–20]. Phenyl halides and phenyl boronic acids undergo Suzuki cross-coupling reaction and produce most useful biphenyl and polyphenyl products [21,22]. These prepared Suzuki products have been widely used as drug intermediates, insecticides, natural products, functional materials and

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