Design and Development of Computational database for the Nanomaterials

[1]Dr. Dnyaneshwari D. Patil , [2]Miss. Jwala Shinde, [3] Dr. Yogesh Rajput, [4]Dr. Ramesh Manza,
[5]Dr. Sanjay Harke
[1,3]Dr. G. Y. Pathrikar College of Computer Science and IT,
[2,5]MGM's Institute of Biosciences and Technology,
[4]Dr. Babasaheb Ambedkar Marathwada University,
[1,2,3,4,5]Aurangabad, India
[1]dnyaneshwari03patil@gmail.com , [2]jwalashinde24@gmail.com

***Abstract*—the creation of Silver nanoparticles database with user friendly interface which is untouched area. The nanoparticles have the impending for transforming the ways in which resources and products are formed and the range of functionalities that can be accessed. Silver nanoparticles are one of the greatest capable products in the nanotechnology industry. They are also more increasingly known for their healing properties, offering treatment options for various illnesses that cannot be treated with traditional methods. Establishment of NanoDB is having versatile approach to provide silver nanoparticles information access on single platform.**

Keywords— NanoDB; nanophase; nanomaterials; nanostructures

I. INTRODUCTION

Nanomaterials are cornerstones of nanoscience and nanotechnology. Nanostructure science and technology is a comprehensive and interdisciplinary area of research and development action that has been increasing explosively global in the former few years. It has the possible for transforming the ways in which materials and products are produced and the variety and nature of functionalities that can be accessed. It is already having a significant commercial impact, which will assuredly increase in the future. The scientific story of nanomaterials however began much later. One of the first scientific report is the colloidal gold particles synthesised by Michael Faraday as early as 1857. Nanomaterials are the particles (crystalline or amorphous) of organic or inorganic materials having sizes in the range of 1-100 nm .Nanomaterials are classified into nanostructured materials and nanophase/nanoparticle materials. The former refer to condensed bulk materials that are made of grains with grain sizes in the nanometer size rang while the latter are usually the dispersive nanoparticles. To distinguish nanomaterials from bulk, it is extremely important to prove the single properties of nanomaterials and their prospective impacts in science and technology. Experts have not universally settled on a precise definition of nanomaterials, but agree that they are partially characterized by their tiny size, measured in nanometers. A nanometer is one millionth of a millimeter - approximately 100,000 times smaller than the diameter of a human hair. Nano-sized particles exist in nature and can be created from a diversity of products, such as carbon or minerals like silver, but nanomaterials by meaning must have at minimum one dimension that is less than approximately 100 nanometers. Maximum nanoscale materials are too small to be seen with the naked eye and even with predictable lab microscopes. Today nanophase engineering enlarges in a fast growing number of structural and functional materials, both inorganic and organic, allowing manipulating mechanical, catalytic, electric, magnetic, optical and electronic functions. The production of nanophase or cluster2 assembled materials is usually based upon the creation of separated small clusters which then are fused into a bulk-like material or on their embedding into compact liquid or solid matrix materials. e.g. nanophase silicon, which differs from normal silicon in physical and electronic belongings, could be applied to macroscopic semiconductor processes to create new devices.

II. LITERATURE SURVEY

In current times nanotechnology has been deliberate extensively due to its prospective applications. Nanotechnology is the utilization of 1-100 nm size nonmaterials that shows properties different than the bulk samples of the same material. This has lead to commercial exploration of nanotechnology in the biological and medica sciences. Many methods of nanoparticles synthesis have been developed and categorized as physical, chemical and biological. Green nanotechnology is an eco-friendly approach for the synthesis of metal nanoparticles and a promising alternative for chemical methods. In this study we have synthesized zinc nanoparticles by utilizing the leaf extract of

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the plant Cestrum Noctrunum as dropping agent. The produced nanoparticles were categorized using Transmission Electron Microscopy (TEM) and Fourier transform infrared spectroscopy (FTIR). TEM analysis exposed spherical nanoparticles with a normal size range of 10-30 nm. Bacterial activity was verified against the bacteria E. coli1. Metallic nanoparticles have a cumulative commercial demand due to their wide applicability in various areas. The current study explores the *Amaranthus oleracea* plant for the simple, rapid and eco-friendly synthesis of silver nanoparticles. It was detected that *Amaranthus oleracea* leaf extract can reduce silver ions into silver nanoparticles in the size series 5-20 nm and it is spherical in shape. Additional, the antibacterial activity of manufactured silver nanoparticles showed actual inhibitory activity against Escherichia coli[2].

We have also manufactured silver nanoparticles using extract of *Eleusine coracana* seeds as a dropping agent. The formation of silver nanoparticles was primarily confirmed using UVVisible spectroscopy and auxiliary characterized by Transmission Electron Microscopy (TEM). TEM analysis exposed spherical shape of silver nanoparticles with an average dimension of 4-25 nm. *Eleusine coracana* seed extract established strong potential for the synthesis of silver nanoparticles by simple and rapid decline of silver ions[3]. Silver nanoparticles are one of the most auspicious products in the nanotechnology industry. Silver nanoparticles are mainly in high request due to their extensive use. They are also more progressively known for their healing properties, contribution treatment options for various diseases that cannot be preserved with outmoded methods. The expansion of nanotechnology has given new potentials of using the silver nanoparticles as an active biomedical factor. The probable of ornamental plant *Syngonium podophyllum* leaf extract has been explored for the synthesis of silver nanoparticles, which was confirmed by appearance of absorption peak at 420 nm in ultraviolet–visible (UV–Vis) spectrum[5]. Nano materials have attracted tremendous interest due to their obvious performance in electronics, optics, and photonics. Nanoparticles have been refining the therapeutic effect of drugs and diminish the side effects. Essentially, Nanoparticles have been prepared by using various techniques as such spreading of preformed polymers, polymerization of monomers and ionic gelatin or co-aeration of hydrophilic polymer.

III. MATERIALS AND METHODS

For the development of NonoDB used tools are listed below:

A. XAMPP Server

XAMPP stands for Cross-Platform (X), Apache (A), MySQL (M), PHP (P) and Perl (P). It is a simple, lightweight Apache supply that makes it tremendously easy for inventors to create a local web server for testing determinations. Everything we want to set up a web server – server application (Apache), database (MySQL), and scripting language (PHP) – is encompassed in a simple extractable file. XAMPP is also cross-platform, which means it works correspondingly well on Linux, Mac and Windows. Since most actual web server deployments use the same components as XAMPP, it makes transitioning since a local test server to a live server is enormously easy as well. Web development using XAMPP is particularly beginner approachable.

XAMPP has four primary components.

A1. Apache Server:

Apache is the genuine web server application that developments and transports web content to a computer. Apache is the most widespread web server online, powering nearly 54% of all websites.

A2. MySQL:

Each web application, howsoever simple or difficult, requires a database for loading collected data. MySQL, which is open source, is the most standard database management system. It powers everything from hobbyist websites to specialized platforms like Word Press.

A3. **PHP Scripting Language**

PHP stands for Hypertext Preprocessor. It is a server-side scripting language that controls some of the most popular websites in the world, as well as Word Press and Facebook. It is open source, comparatively easy to learn, and works flawlessly with MySQL, making it a common choice for web developers[7].

A4. Perl

Perl is a high-level, dynamic programming language used expansively in network programming, system admin, etc. Although less common for web development purposes, Perl has a lot of place applications.

B. XAMPP Installation:

B1. Downloading XAMPP

XAMPP is available in three file formats:

1. EXE – Self-executable file; easiest to install.
2. 7z – 7zip file. Favored by purists, although it needs working with more complex .bat files to install.
3. ZIP – Compressed zip file. Like .7z, installing over .ZIP files is significantly more difficult than using .EXE

B2. Installing XAMPP

Followed these steps for installing XAMPP:

Step 1: Restrict your anti-virus as it can cause some XAMPP modules to behave erratically.

Step 2: Restrict User Account Control (UAC). UAC limits write consents to XAMPP's default installation directory (c:/Program Files/xampp), compelling you to install in a discrete directory. You can study how to disable UAC here. (Optional)

Step 3: Start the installation procedure by double-clicking on the XAMPP installer. Click 'Next' after the splash screen.

Step 4: Here, you can select the modules you want to install. Choose the default selection and click 'Next'[8].

Step 5: Choose the folder you want to install XAMPP in. This folder will grasp all your web application files, so make definite to select a drive that has sufficiently of space.

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Step 6: The next screen is a promotion for BitNami, an app store for server software. Reject the 'Learn more about BitNami for XAMPP' checkbox.

Step 7: System is now ready to install XAMPP. Click Next and wait for the installer to unpack and install selected modules. This may take a few minutes. You may be asked to support Firewall access to certain components (such as Apache) throughout the installation process.

Step 8: Installation is now complete! Select the 'Do you want to start the Control Panel now?' checkbox to open the XAMPP control panel (Fig B2).

Figure B2: XAMPP Control Panel

Figure B2.1 Local host Window

Step 9: Type **local host** on your browser and press enter

C. Workflow

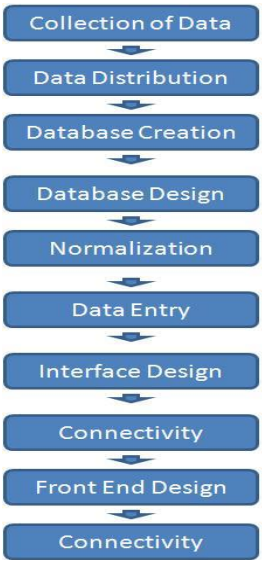

Figure c. Workflow Diagram.

Figure C1: Data sheet of Nanomaterials

C1. **Collection of Data:**

Data gathering is the orderly approach to collecting and calculating information from a diversity of sources to get a whole of an area of interest. This database is gathering of data for the combination of nanoparticles plant Name, Size, Year, Author, against activity etc.

C2. Distribution of Data: The data of Nanomaterials:-

C2.1.Plant Name: This Plant Name could be text or numbers that uniquely identify each row of data.

C2.2.Size: these Plant sizes that uniquely identify for each row of data.

C2.3.Year: when these Plant research papers are published for the date, month and year.

C2.4.Material: Which materials are used for Plant for eg. Leaf, root, seed etc.

C2.5.Author: whose are worked for the research Paper as a staff or student.

	A	B	C	D	E
1	**Plant Name**	**Size**	**Year**	**Material**	**Author**
2	Amaranthus oleracea	5-20 nm	Apr-16	Leaf	Nilesh Paul, Pratik Sharma , Pooja Gaikwad , Rahul Dhangare , Archana Panche , Sanjay Harke
3	*Aegle marmelos*	~60 nm	Nov-12	Leaf	K. Jagajjanani Rao , Santanu Paria
4	*Ocimum tenuiflorum*	430 nm	Jun-11	Leaf	Yogeswari Rout , Sikha Behera, Akshya Kumar Ojha and P. L. Nayak
5	*Lawsonia inermis*	100gm	9/1/2016	Leaf	Dama L. B., Mane P. P., Pathan A. V., Chandarki M. S., Sonawane S. R., Dama S. B., Chavan S. R. Chondekar R.P. and Vinchurka
6	*Azadirachta indica*	436–446 nm.	Jun-15	Leaf	Shakeel Ahmed , Saifullah ,Mudasir Ahmad ,Babu Lal Swami ,Saiqa Ikram
7	*cestrum nocturmun*	1-100nm	Jun-16	Leaf	Nilesh Paul, Asifuddin Syed,Parth Vywahare,Ravindra Dakle,Balaji Ghuge
8	Amaranthus oleracea	5-20 nm	May-16	leaf	Nilesh Paul , Pratik Sharma , Pooja Gaikwad , Rahul Dhangare , Archana Panche1, Sanjay Harke
9	Eleusine coracana	4-25 nm	Apr-16	seed	Nilesh Paula,b* , Eesha Kholea , Swapnil Jagtapa , Harshada Tribhuvana , Gajanan Kakdea , Pratiksha Kuwara , Archana Panch
10	*Ocimum basilicum*	50 nm	Sep-14	Leaf	Hasna Abdul Salam ,Rajeshwari Sivaraj
11	Siberian Ginseng	126 &189 nm	Yr-2016		Abbai R, Mathiyalagan R, Markus J, Kim YJ, Wang C, Singh P, Ahn S, Farh ME, Yang DC
12	*Ceratonia siliqua*	5 to 40 nm	Apr-13		Awwad, A.M., Salem, N.M. & Abdeen, A.O.
13	*Thevetia peruviana*	570 nm	Jul-05	Latex	N Nyoman Rupiasih1,3,4, Avinash Aher2 , Suresh Gosavi2 and P B Vidyasagar2
14	Vitex negundo	420 nm	Aug-14	Leaf	P. Kathireswari1 , S.Gomathi2 and K.Saminathan
15	*Ananas comosus*	12 nm	Nov-12	Leaf	Naheed Ahmad,Seema Sharma
16	Costus igneus	536nm	Yr-2015	Leaf	S.VELUMANI
17	Catharanthus roseus	1–100 nm	Yr-2014	Leaf	Krishnaveni.B and Priya.P
18	Calotropis gigantea	20-35 nm	Yr-2014	Leaf	S. Priya1 , K. Murugan1 , A. Priya1 , D. Dinesh1 , C. Panneerselvam1 , G. Durga Devi1 , B. Chandramohan1 , P. Mahesh Kumar1
19	Bryophyllum	445 nm	Yr-2015	Leaf	Dulen Saikia1* , Pradip K. Gogoi2 , Pallabi Phukan1 , Nilave Bhuyan3 , Sangeeta Borchetia4 , Jibon Saikia5
20	Withania somnifera	5-40nm	Yr-2013	Leaf	Veera babu Nagati1 , Rama Koyyati1 , Rajkiran Banala2, Jahnavi Alwala1 , Manisha R Donda1 , Pratap Rudra Manthur Padigya
21	Banana peel	1.75 mM	Jul-15	Pulp	Haytham M.M. Ibrahim
22	*Abelmoschus esculentus*		May-15	Pulp	Md. Masud Rahaman Mollick ,Dipak Rana ,Sandeep Kumar Dash ,Sourav Chattopadhyay ,Biplab Bhowmick ,Dipanwita Ma ,Somenath Roy ,Mukut Chakraborty ,Dipankar Chattopadhyay
23	Eucalyptus globulus	1 to 100 nm	Jan-14	Leaf	A.F.Abd El-Rahman and 2 Tahany.G.M. Mohammad

C2. 6.Against Activity: Many researchers are worked for firstly synthesis of nanoparticles and then against ntibacterial activity or etc.

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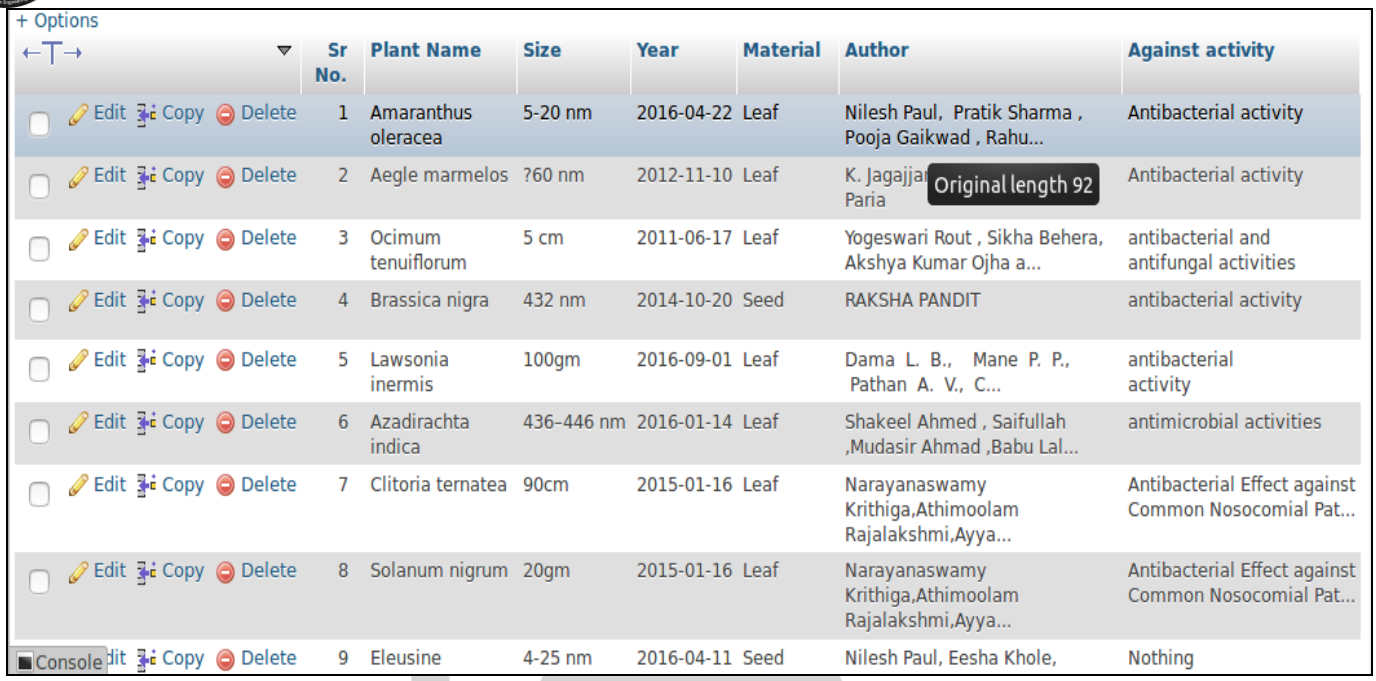

+ Options

	Sr No.	Plant Name	Size	Year	Material	Author	Against activity
Edit Copy Delete	1	Amaranthus oleracea	5-20 nm	2016-04-22	Leaf	Nilesh Paul, Pratik Sharma , Pooja Gaikwad , Rahu...	Antibacterial activity
Edit Copy Delete	2	Aegle marmelos	?60 nm	2012-11-10	Leaf	K. Jagajjan Paria	Antibacterial activity
Edit Copy Delete	3	Ocimum tenuiflorum	5 cm	2011-06-17	Leaf	Yogeswari Rout , Sikha Behera, Akshya Kumar Ojha a...	antibacterial and antifungal activities
Edit Copy Delete	4	Brassica nigra	432 nm	2014-10-20	Seed	RAKSHA PANDIT	antibacterial activity
Edit Copy Delete	5	Lawsonia inermis	100gm	2016-09-01	Leaf	Dama L. B., Mane P. P., Pathan A. V., C...	antibacterial activity
Edit Copy Delete	6	Azadirachta indica	436-446 nm	2016-01-14	Leaf	Shakeel Ahmed , Saifullah ,Mudasir Ahmad ,Babu Lal...	antimicrobial activities
Edit Copy Delete	7	Clitoria ternatea	90cm	2015-01-16	Leaf	Narayanaswamy Krithiga,Athimoolam Rajalakshmi,Ayya...	Antibacterial Effect against Common Nosocomial Pat...
Edit Copy Delete	8	Solanum nigrum	20gm	2015-01-16	Leaf	Narayanaswamy Krithiga,Athimoolam Rajalakshmi,Ayya...	Antibacterial Effect against Common Nosocomial Pat...
Edit Copy Delete	9	Eleusine	4-25 nm	2016-04-11	Seed	Nilesh Paul, Eesha Khole,	Nothing

Original length 92

Console

C3. Database Creation:

Designing is the part of developing the interface or frontend from which user can interacts with the database. Using the interface user can operate the database of nanomaterials.

C3.1.MySql Query

UserLogin Table: Table structure for table `UserLogin`

CREATE TABLE `UserLogin` (` UserNo` int(11) NOT NULL,`First Name` varchar(20) NOT NULL,`Middle Name` varchar(20) NOT NULL,`Last Name` varchar(20) NOT NULL,`Email` varchar(20) NOT NULL,`Password` varchar(8) NOT NULL) ENGINE=InnoDB DEFAULT CHARSET=latin1;

NanoData Table:

Database: `Nanoparticle`Table structure for table `NanoData`

CREATE TABLE `NanoData` (`Sr No.` int(3) NOT NULL, `Plant Name` varchar(50) NOT NULL,`Size` varchar(10) NOT NULL,`Year` date NOT NULL,`Material` varchar(10) NOT NULL,`Author` varchar(200) NOT NULL,`Against activity` varchar(100) NOT NULL) ENGINE=InnoDB DEFAULT CHARSET=latin1;

Figure C1: Data sheet of Nanomaterials

C4. Database Design:

C4.1. User Login:

Sr.No	Field Name	Data Type	Size	Constraint	Description
1	UserNo	Int	11	Primary Key	Gives the serial number to the User
2	First Name	VarChar	20	Not Applicable	Gives the First name of the user
3	Middle Name	VarChar	20	Not Applicable	Gives the Middle name of the user
4	Last Name	VarChar	20	Not Applicable	Gives the Last name of the user
5	Email	VarChar	20	Not Applicable	Specifies the Email ID of user
6	Password	VarChar	8	Not Applicable	Specifies the password of user

Figure. C4.1 User Login

C4.2 NanoData:

Sr.No	Field Name	Data Type	Size	Constraint	Description
1	Sr.No.	Int	3	Primary Key	Gives the serial number to the Plant
2	Plant Name	VarChar	50	Not Applicable	Gives the Plant name
3	Size	VarChar	10	Not Applicable	Specifies the Size of the Plant
4	Year	Date	-	Not Applicable	Specifies the Year of Publish of Article
5	Material	VarChar	10	Not Applicable	Specifies which material of plant
6	Author	VarChar	200	Not Applicable	Specifies the who work on Plant
7	Against activity	VarChar	100	Not Applicable	Specifies which activity of the plant

Figure. C4.2 NanoData

C5. Database Normalization

Database normalization, is the process of organizing the columns (attributes) and tables (relations) of a relational database to reduce data redundancy and improve data integrity. First step of software designing is analysis of the application definition. Based on that definition proper data is Collected. Normalization process used to create logical structure of database so that basic operation can performs easily.

Figure C5: Inserted data in NanoData table

C6. Interface Design

Designing is the part of developing the interface or frontend from which user can interacts with the database. Using the interface user can operate the database of nanomaterials.

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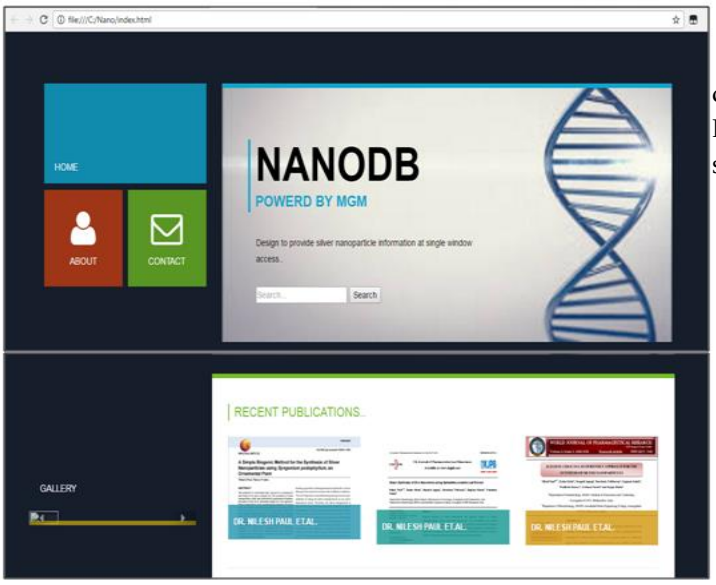

Figure C6: Contact Page

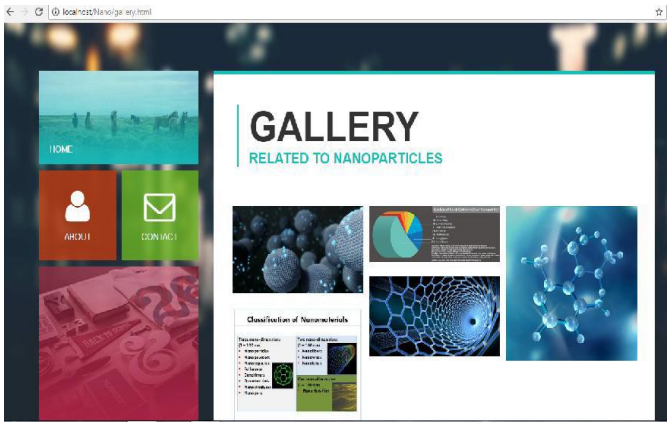

Figure C6.1 Gallery of Nanoparticles

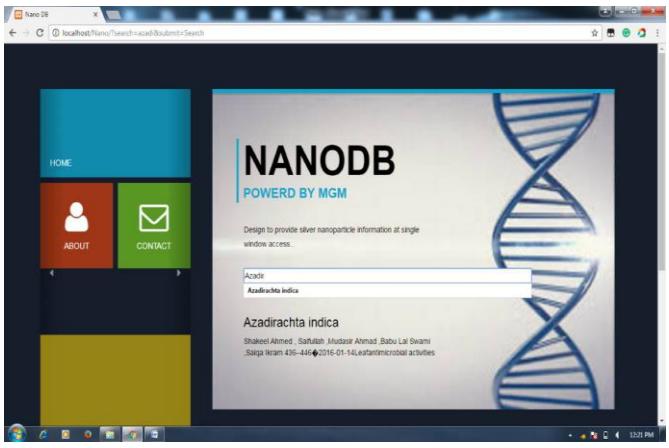

Figure C6.2 Data search page

IV. Results and Conclusions

1. The main purpose of establishment of NanoDB is to provide single window access to single nanoparticles information.

2. NanoDB is agent for awareness and development for Information and communication Technology (ICT).

3. The Standard database has developed for Nanomaterials that will be used for analyze the variety of Nanomaterials and to further research in nanotechnology.

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