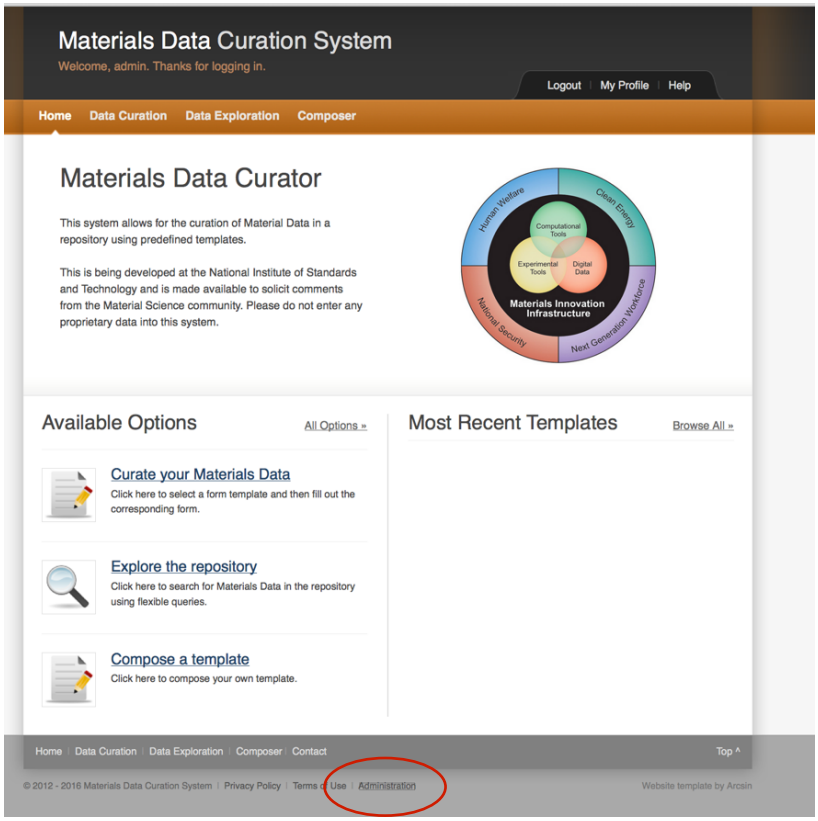
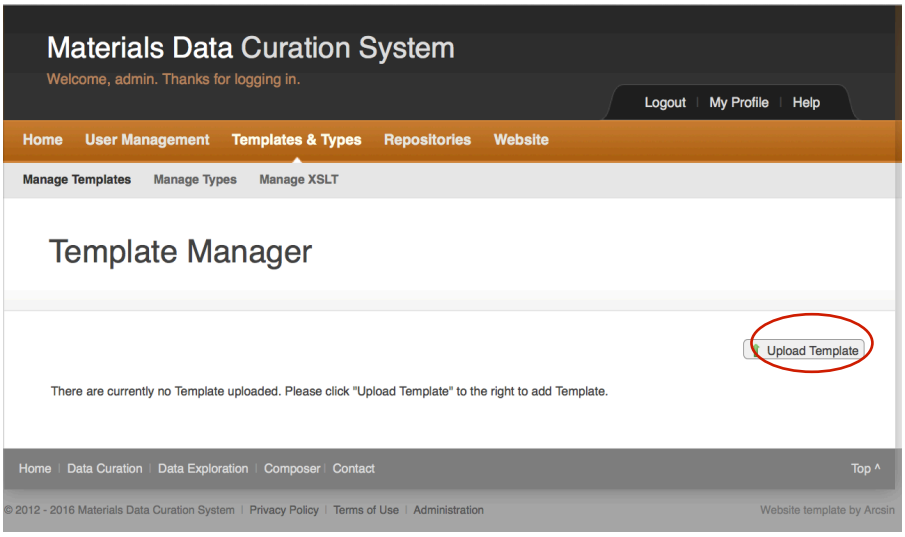
Data Curation: Diffusion Couple- Rene88-IN100

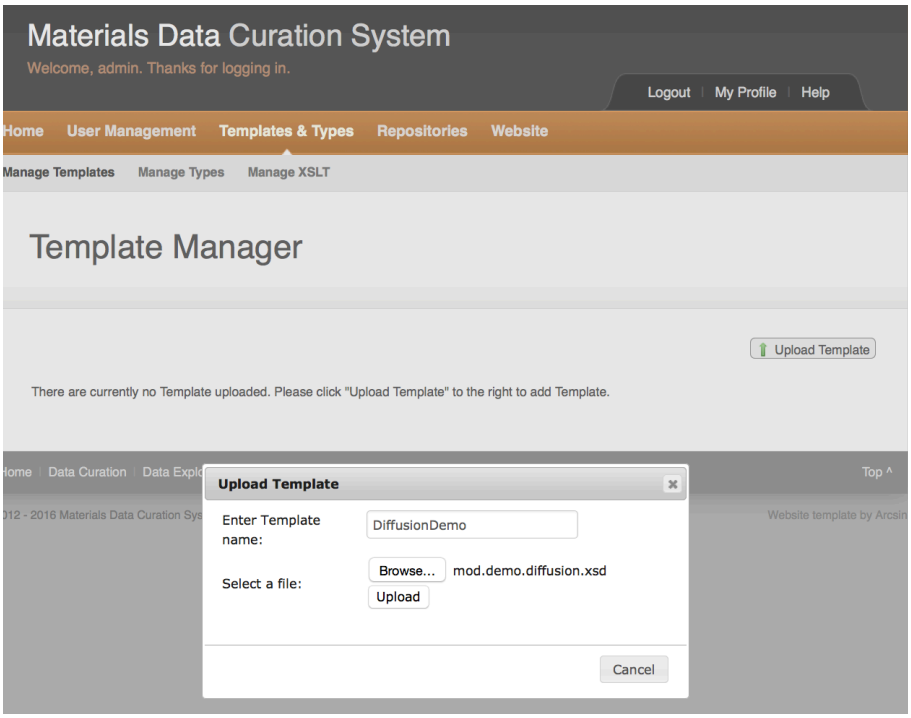
1. To start this tutorial, we first need to upload the “DemoDiffusion” template. So we start Administrator dashboard and “Templates &Types” menu.



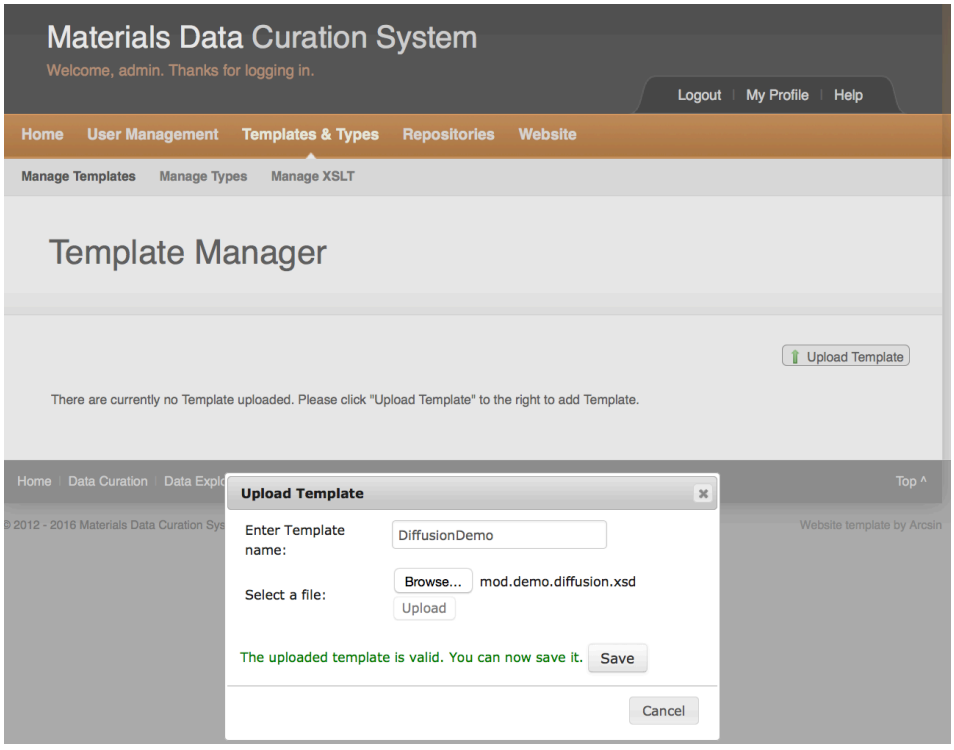
2. Under the “Template & Types” window, select upload template.



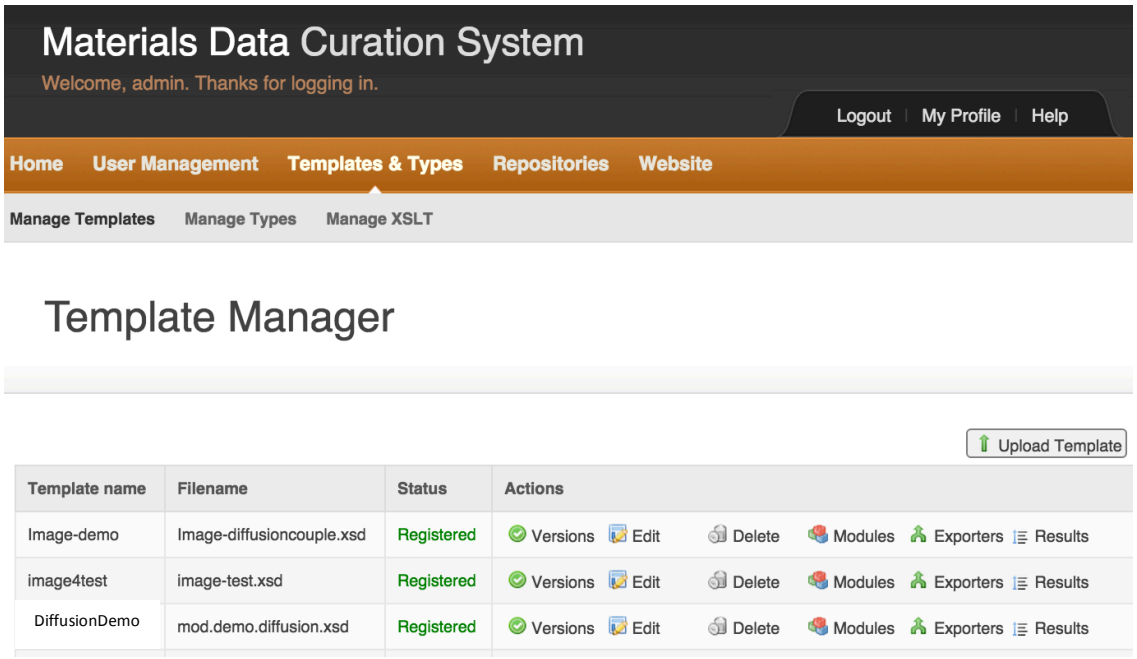
3. Upload the “mod.demo.diffusion.xsd” template and label it “DiffusionDemo”



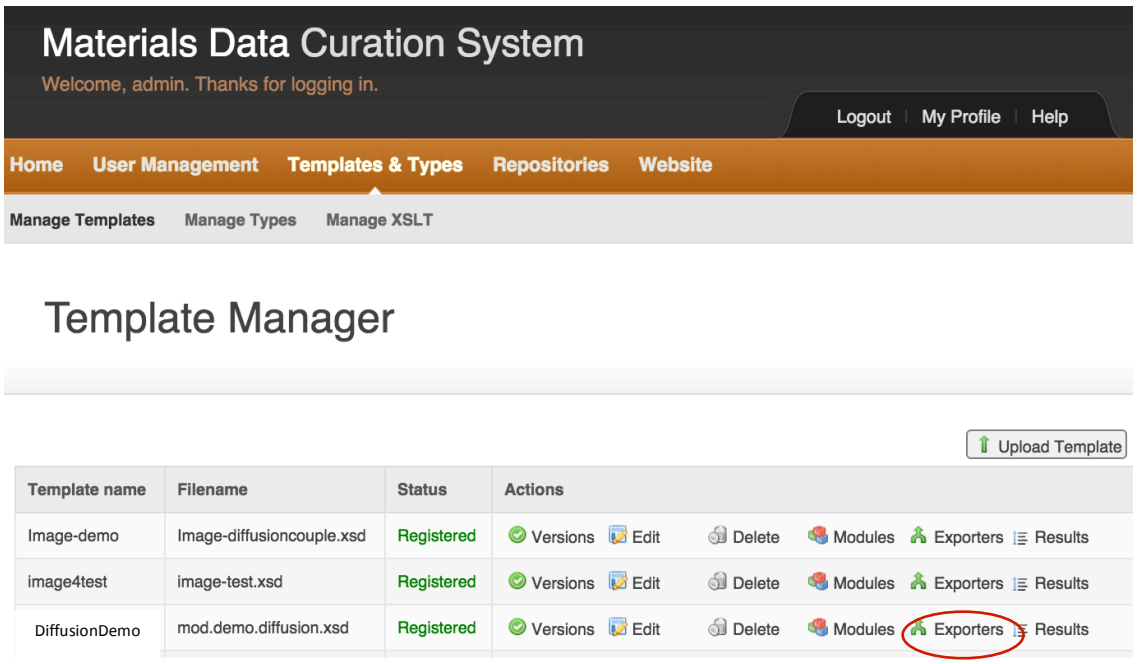
When you have located the file and named the template, click upload. If the upload is successful, you will get a message telling you that you can save the template to the MDCS.



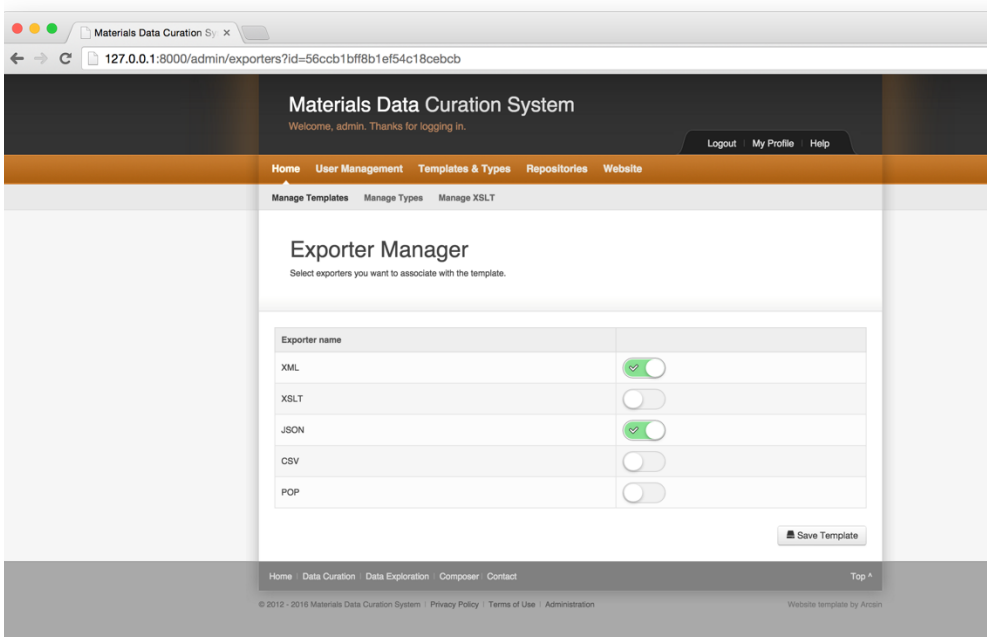
The saved template will then appear in the “Template Manager”



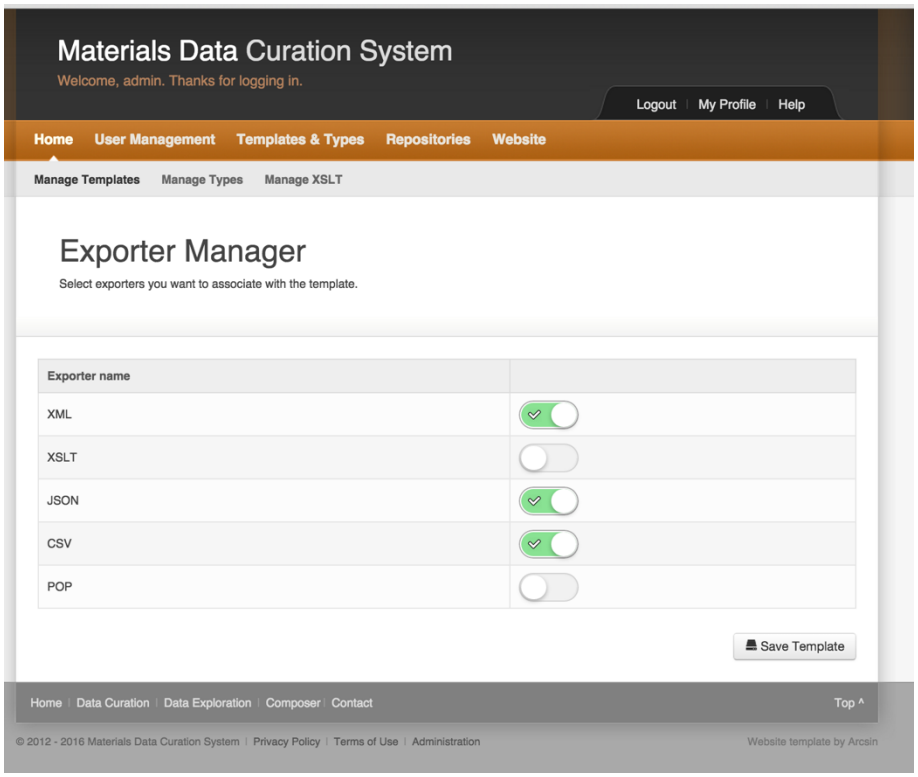
Now that the template has been loaded, we check the available “Exporter” options. To do this click on the “Exporters” in the “DiffusionDemo” row.



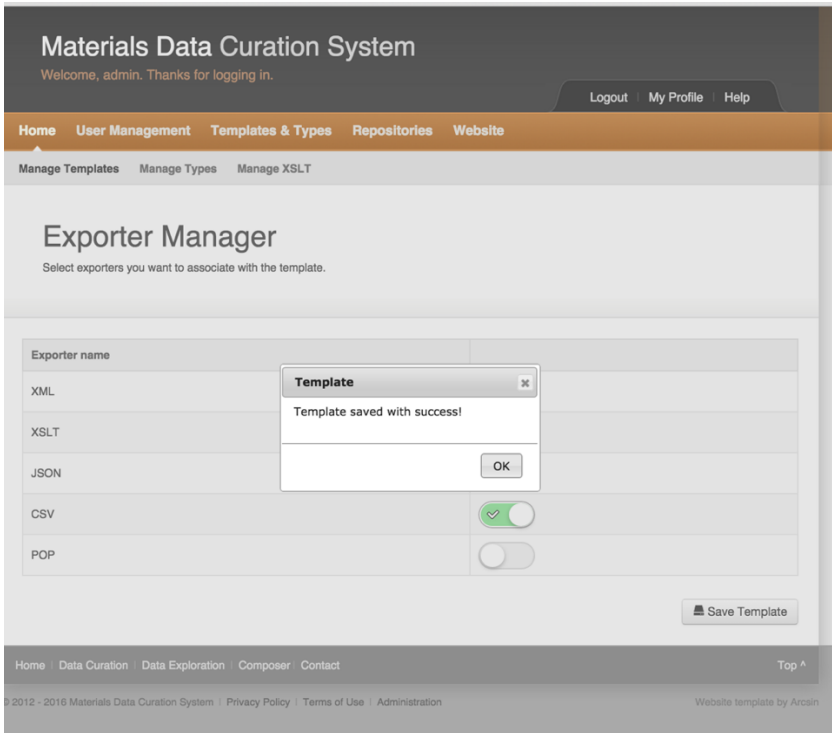
Next a menu with a choice of available options will appear



Chose to toggle on the CSV exporter.

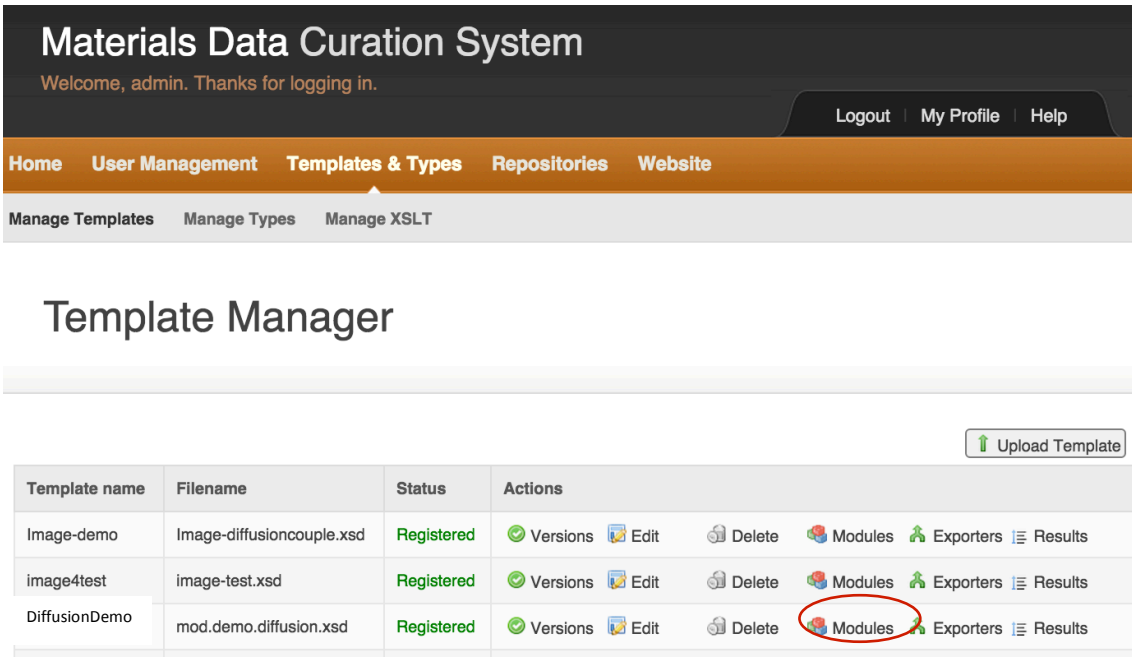


You will then be asked to save the template.

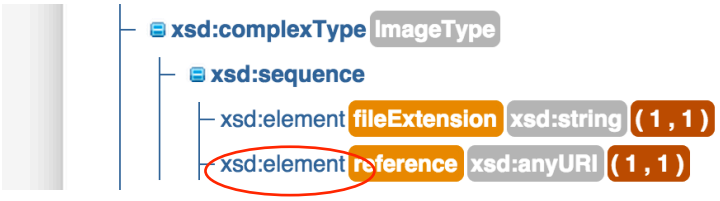


After adding the “Exporters,” return the Template Manager

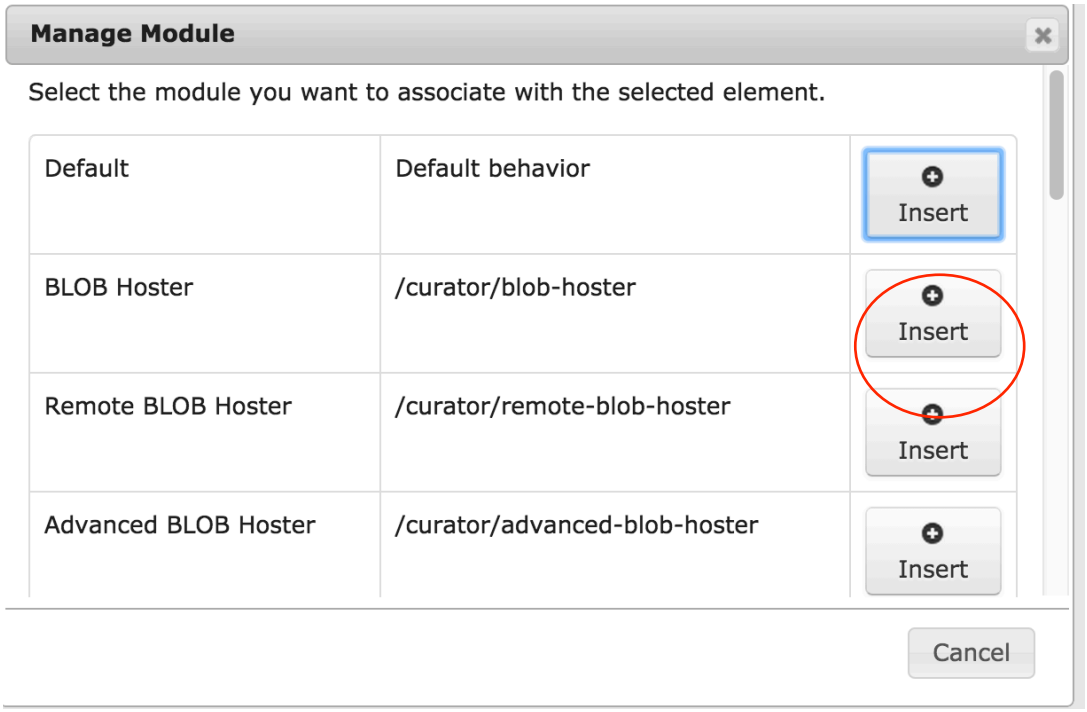
We now have one additional change the Template to make. We need to add the module allowing an image to be upload. This time at the Template Manager, select the “Modules” entry in the DiffusionDemo entry.



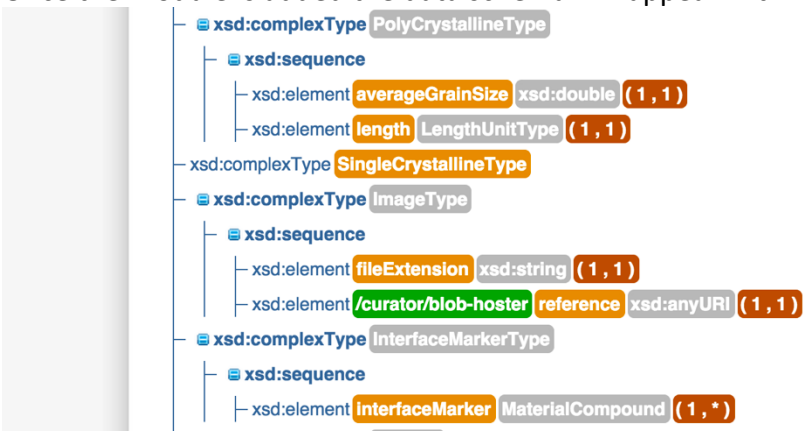
You will then see a screen showing the different elements of the schema. The items in "green" are user-interface modules. We want to add a module to the "Image Type." To do this scroll past the list chemical elements in periodic table (about half way down, you can also use the browser "Find" feature) the "Image Type" and select the element named "reference"



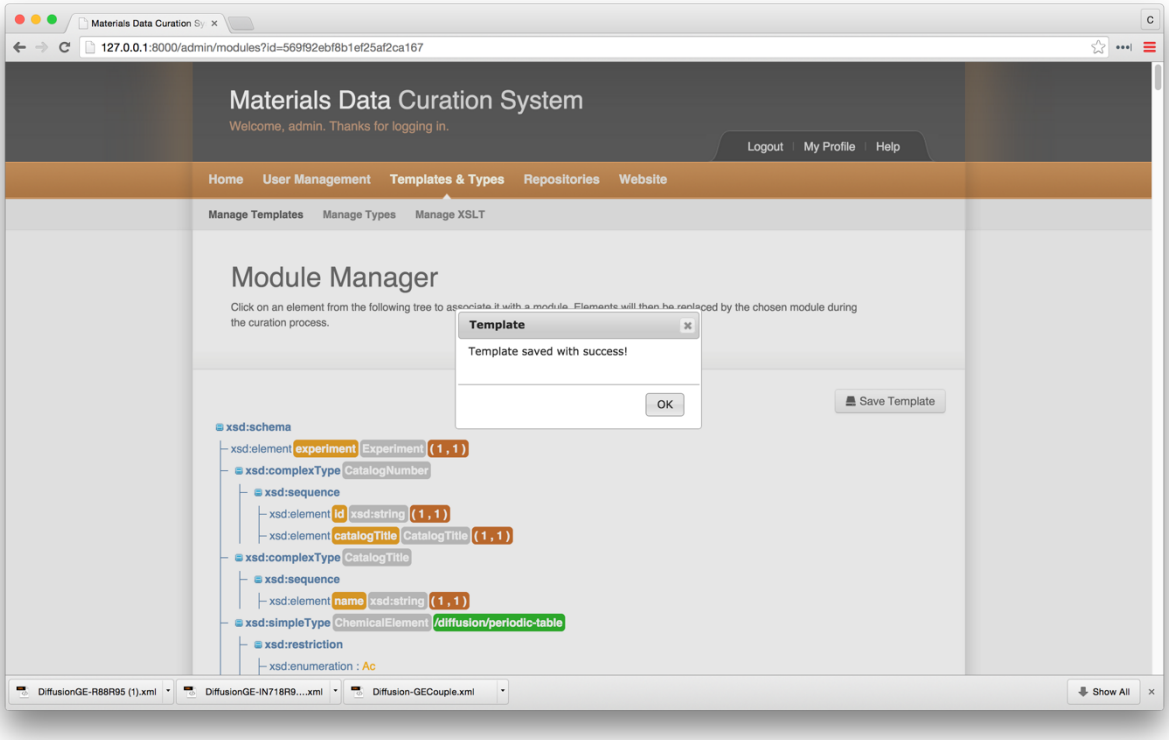
After selecting the element, the Module Manager will appear and select BLOB Hoster



Once the Module is added the data schema will appear with module in green.



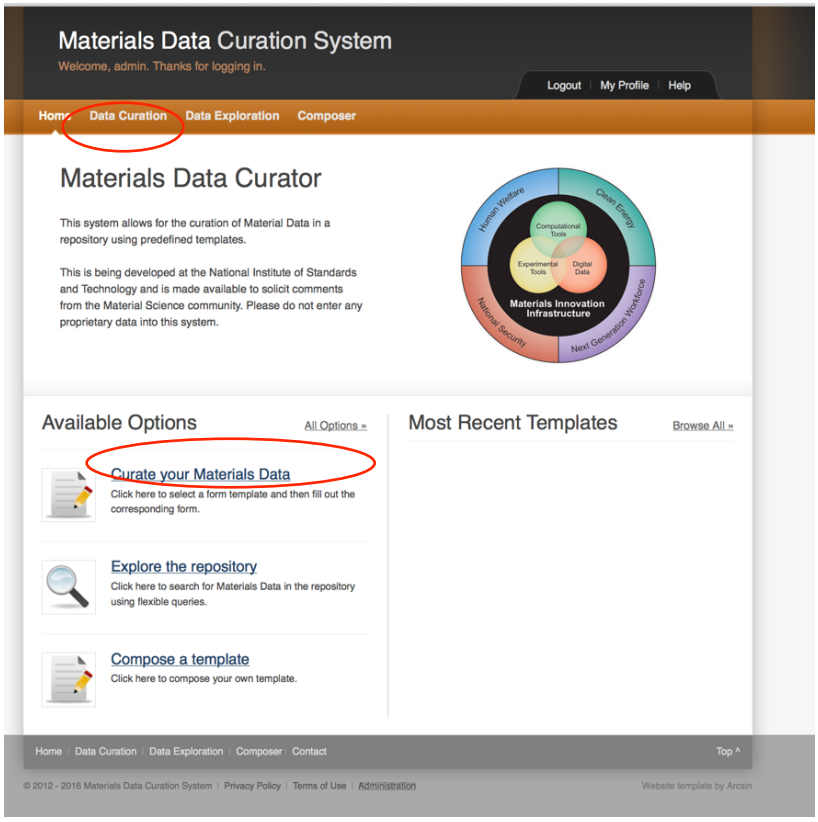
Now scroll up to the top of the page and save the template.



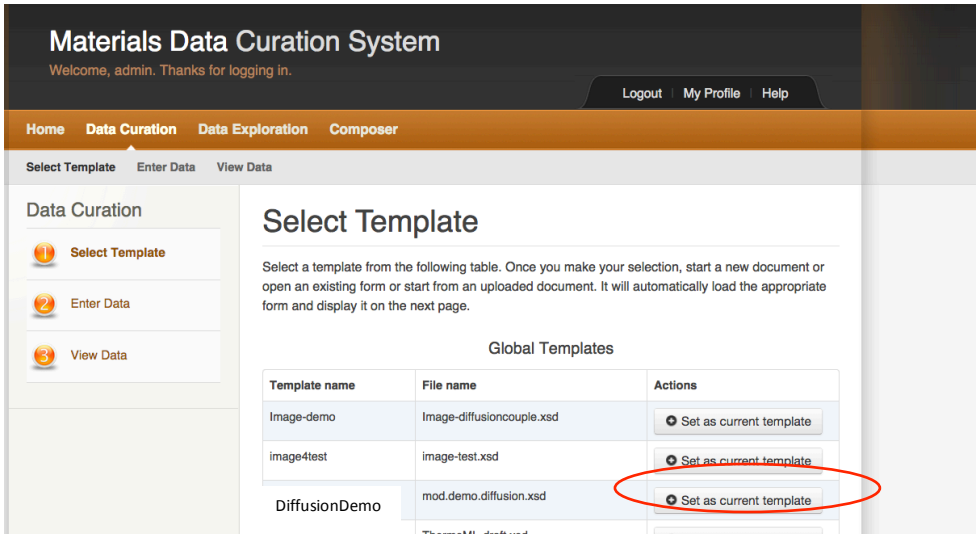
Now we are ready to curate some data related to a diffusion couple between IN100 and Rene-88 which had a diffusion anneal for 1000 h at 1150 C. We will be entering some metadata about the experiment, the collected composition profile and corresponding micrograph of the diffusion couple.

So return to “Home” screen.

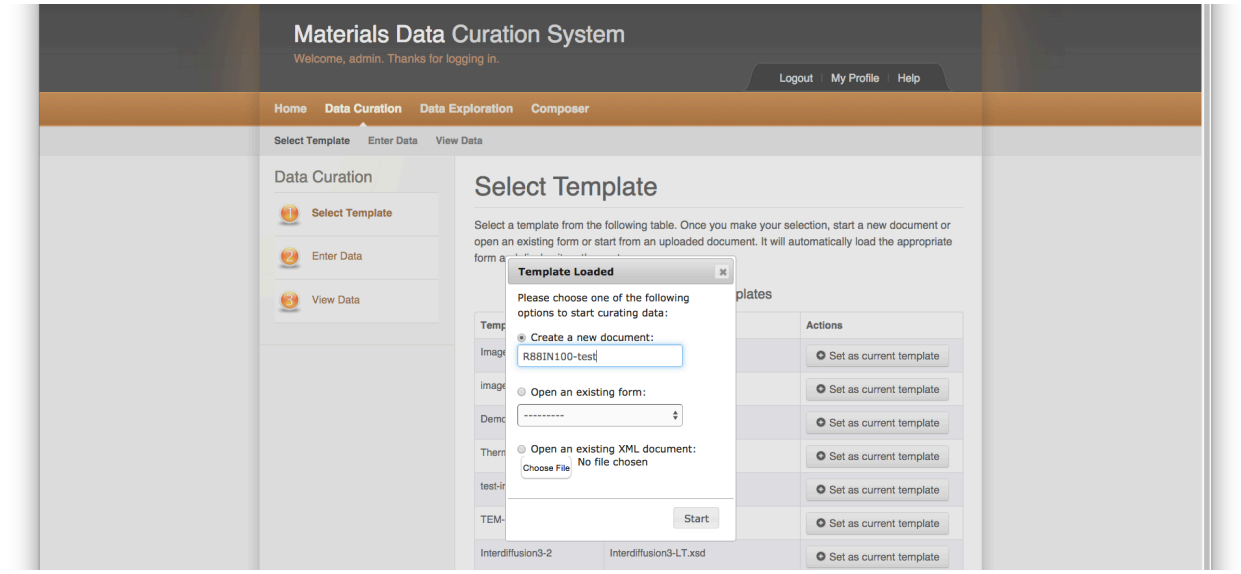
From the “Home” screen, select “Data Curation” on the navigation ribbon or from the “Available Options”



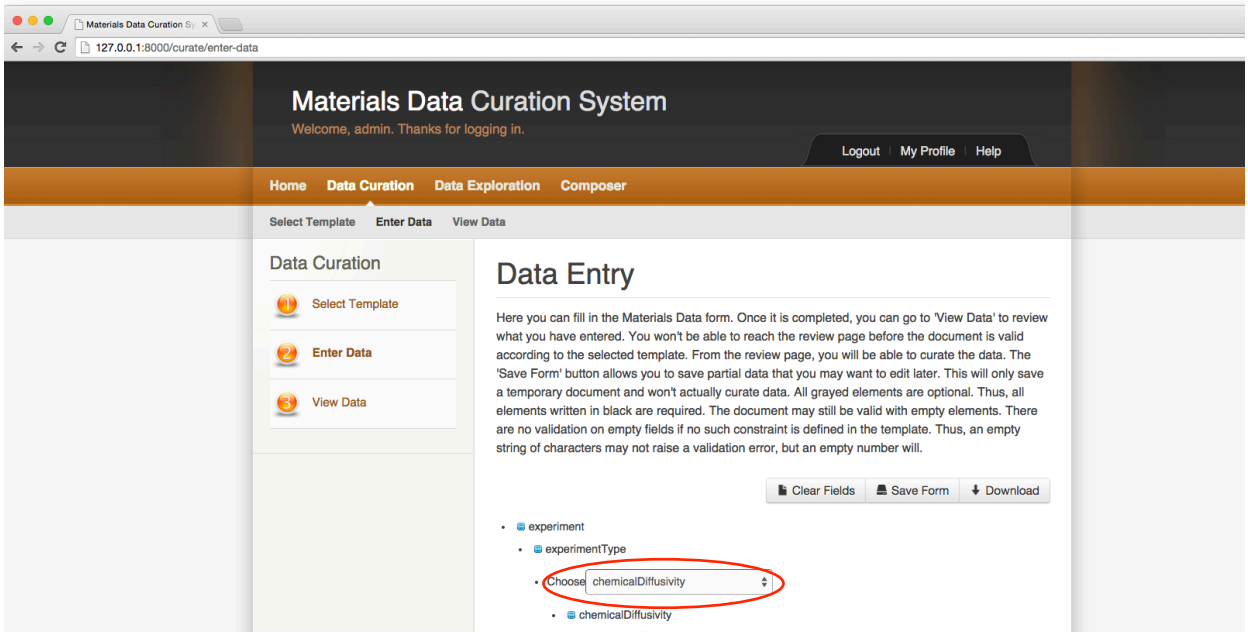
Select “DemoDiffusion” template in the Data Curation Menu



4. Create a new document “R88IN100”



5. The next step is to select the type of diffusion experiment. In this case it is “chemical diffusivity”



Next enter the information at about the diffusion couple end-members. First, the information for Rene-88.

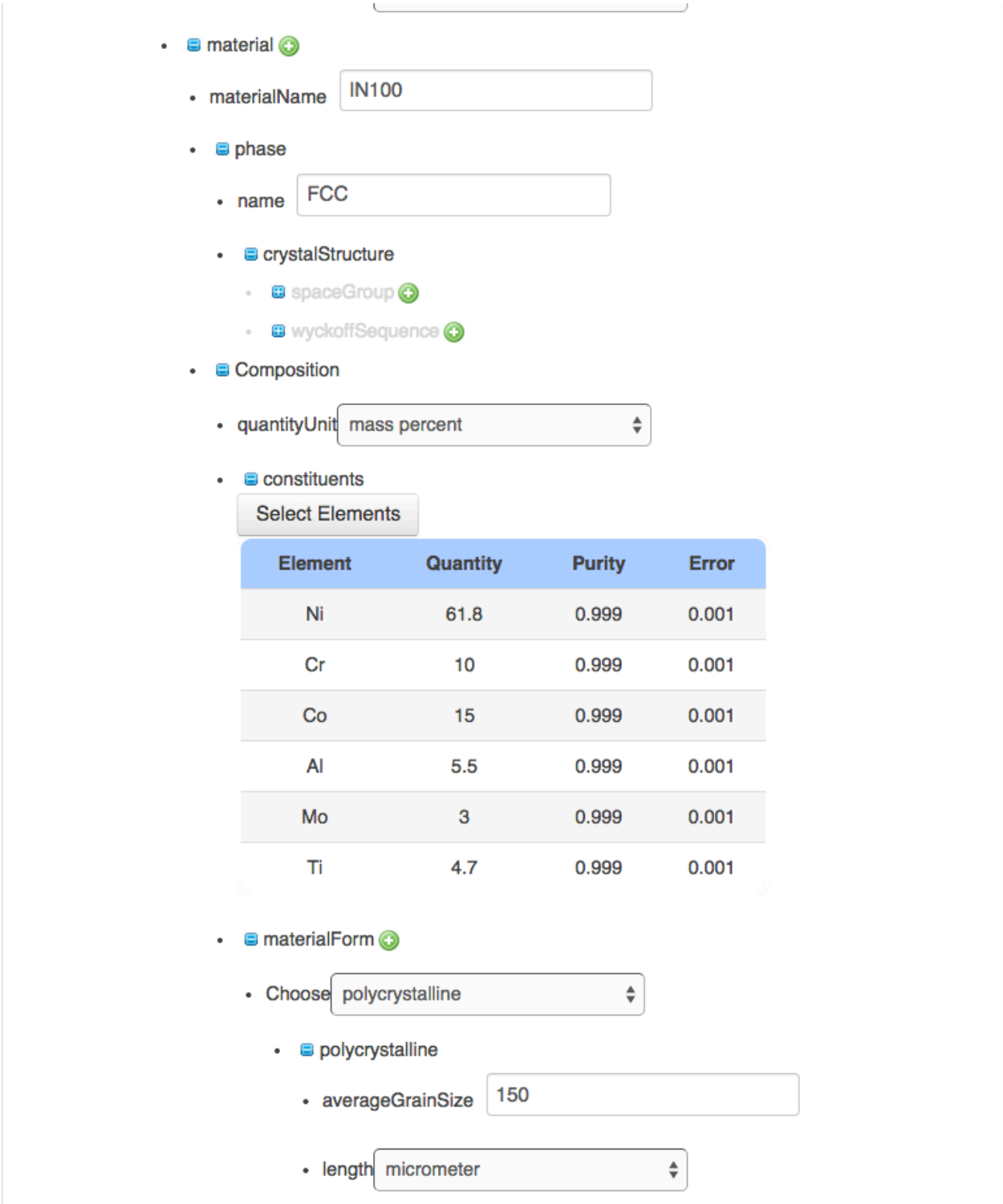
- chemicalDiffusivity
  - material
    - materialName: Rene-88
    - phase
      - name: FCC
      - crystalStructure
        - spaceGroup
        - wyckoffSequence
    - Composition
      - quantityUnit: mass percent
      - constituents

Select Elements

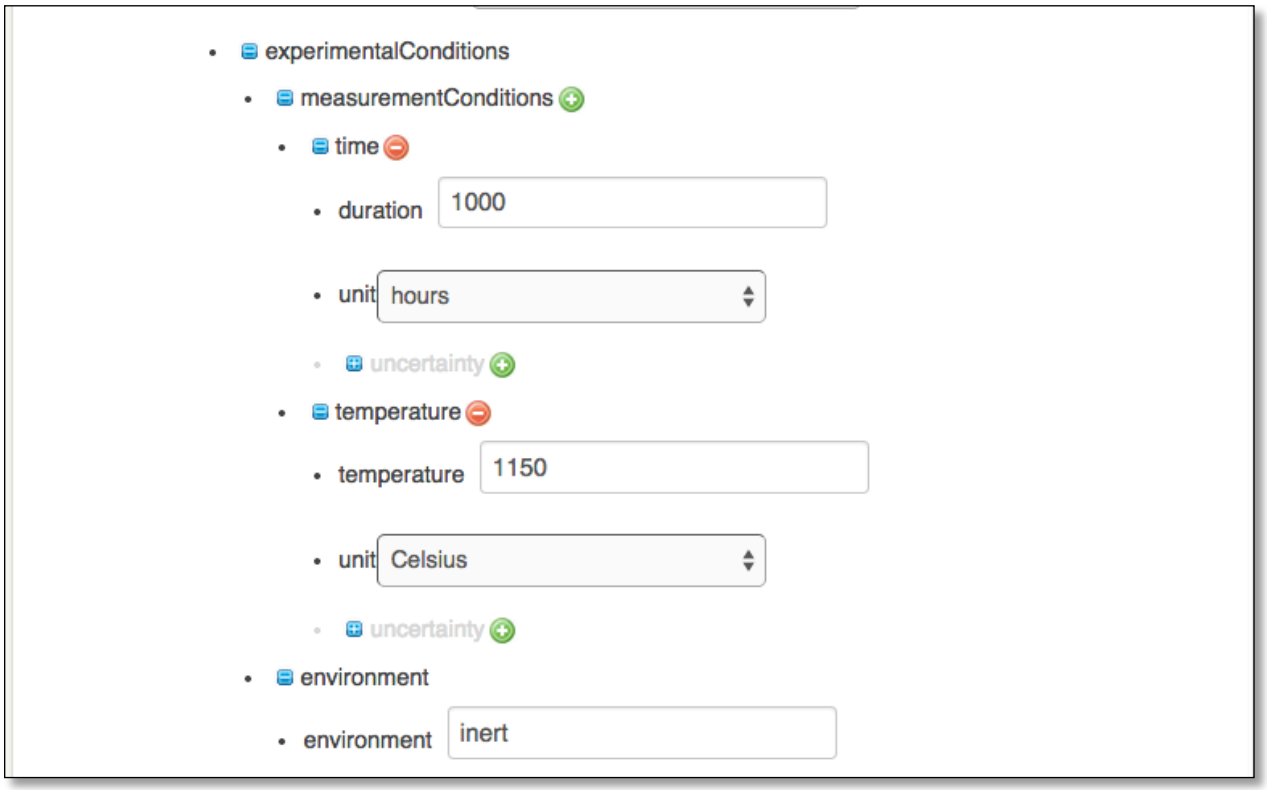
Element	Quantity	Purity	Error
Ni	58.1	0.999	0.001
Cr	10	0.999	0.001
Co	15	0.999	0.001
Al	5.5	0.999	0.001
Mo	3	0.999	0.001
Nb	0.7	0.999	0.001
W	4	0.999	0.001
Ti	3.7	0.999	0.001

- materialForm
  - Choose: polycrystalline
    - polycrystalline
      - averageGrainSize: 200
      - length: micrometer

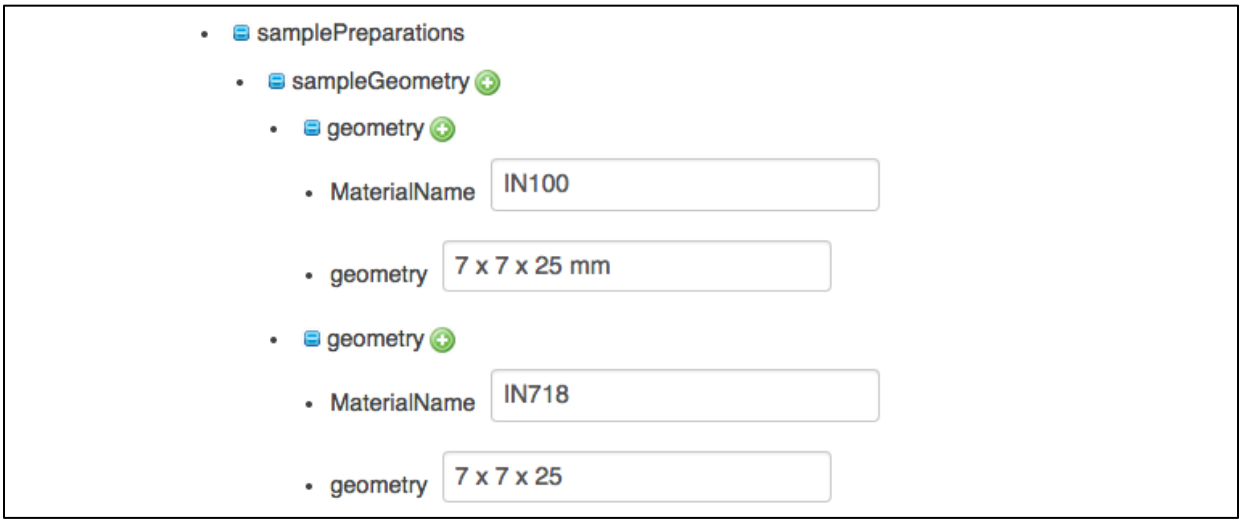
Now enter the information for IN100 alloy.



Next, enter the experimental conditions for the diffusion anneal.



Enter the sample geometries for the two end-members of the diffusion couple.

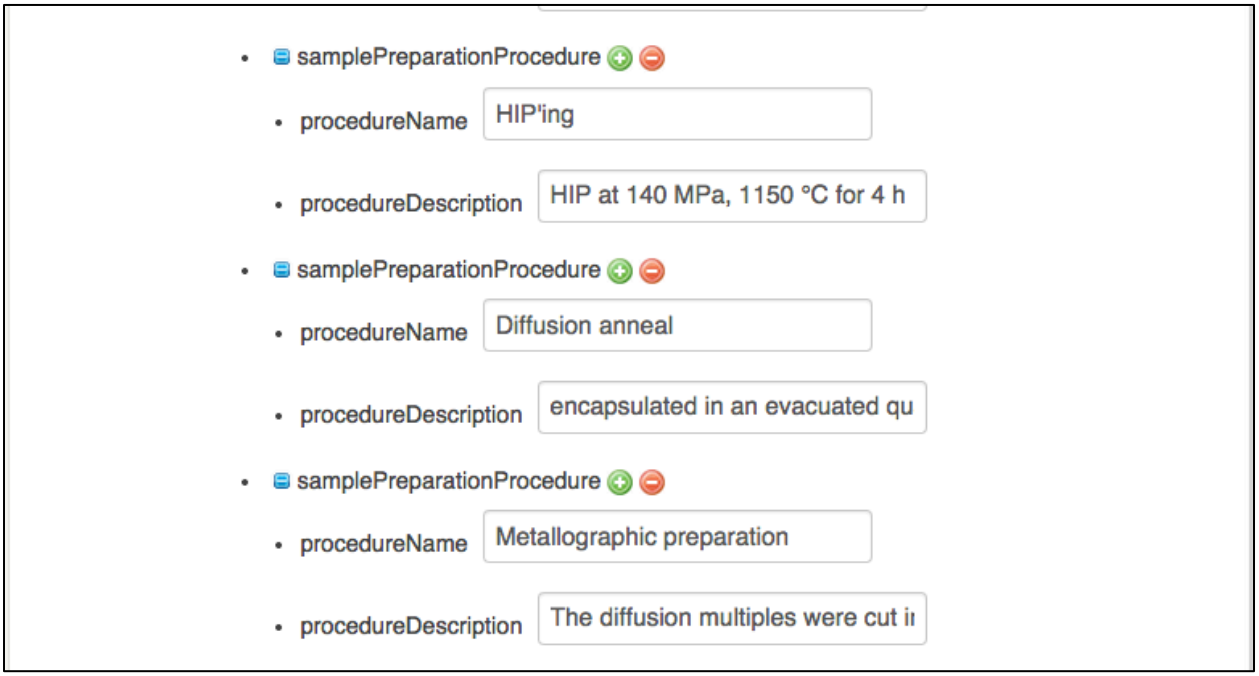


Next enter some sample preparation information. Note these are just text strings.

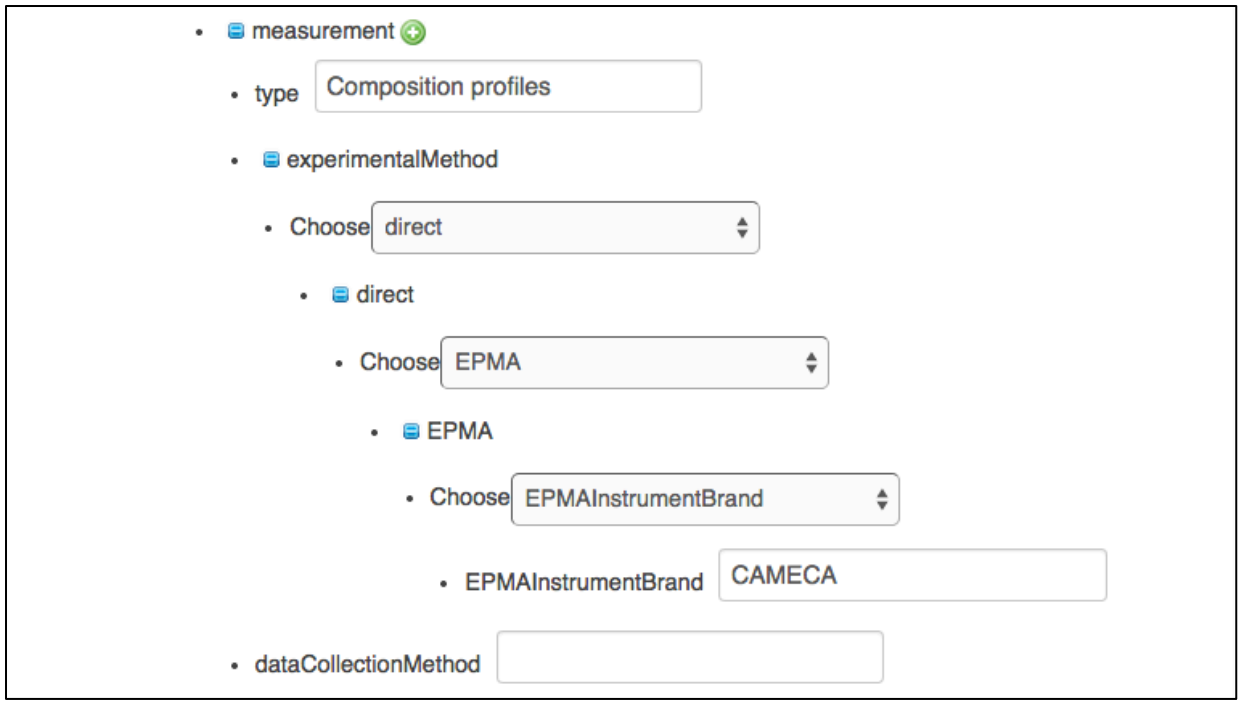
Sample Preparation Procedure Name: HIP'ing
Procedure Description: HIP at 140 MPa, 1150 °C for 4 h

Sample Preparation Procedure Name: Diffusion anneal
Procedure Description: Encapsulated in an evacuated quartz tube and backfilled with argon. Annealed at 1150 C and water quenched

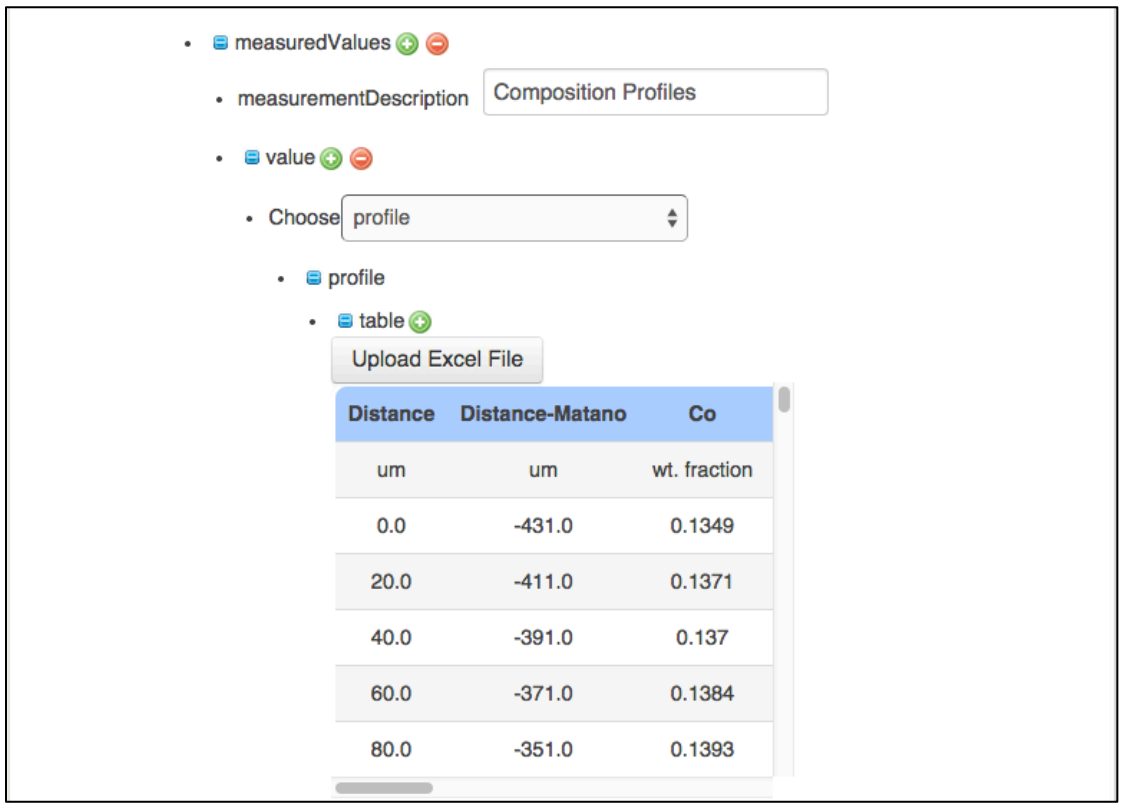
Sample Preparation Procedure Name: Metallographic Preparation
Procedure Description: The diffusion multiples were cut into two halves in a parallel orientation to the end cap disks. The cut surfaces were ground and polished.



Now enter some information on the data collected. The composition profiles for this experiment were collected using EPMA.

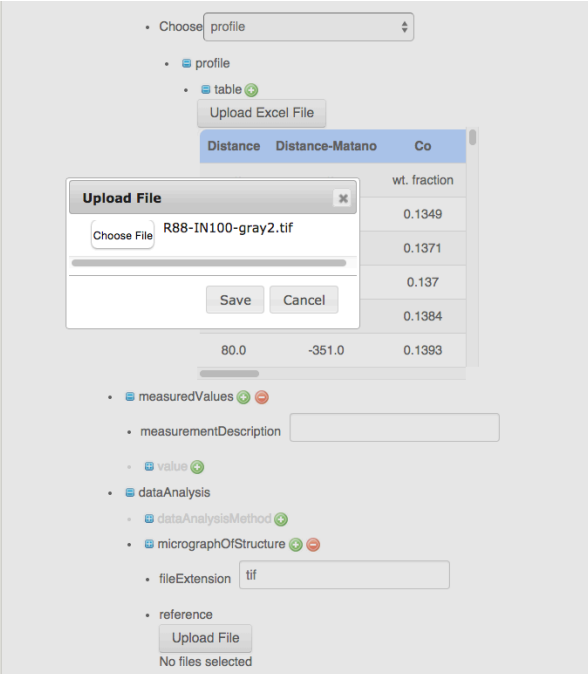


Now enter the collected experimental composition profile (upload an excel spreadsheet: GE-DiffusionCouple-R88-IN100.xlsx)

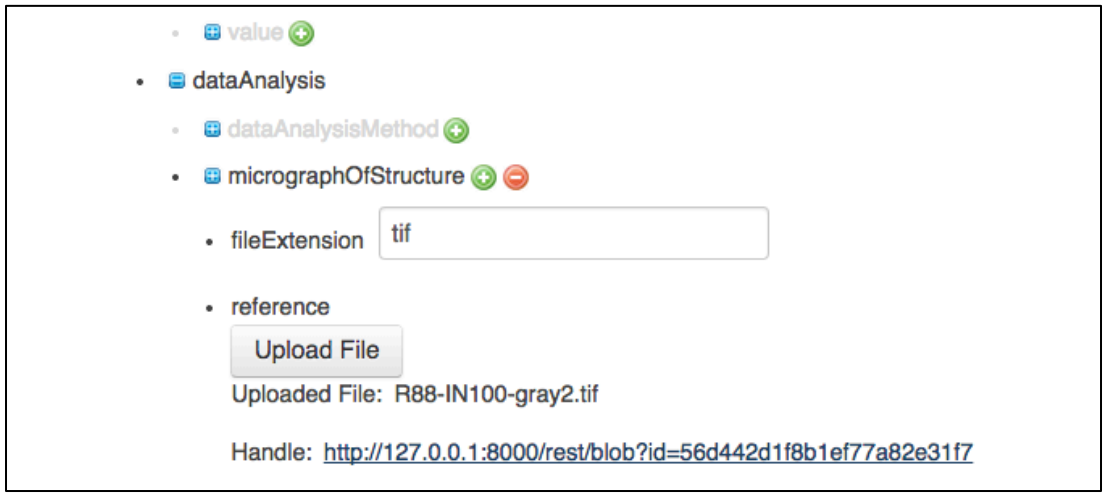


Distance	Distance-Matano	Co
um	um	wt. fraction
0.0	-431.0	0.1349
20.0	-411.0	0.1371
40.0	-391.0	0.137
60.0	-371.0	0.1384
80.0	-351.0	0.1393

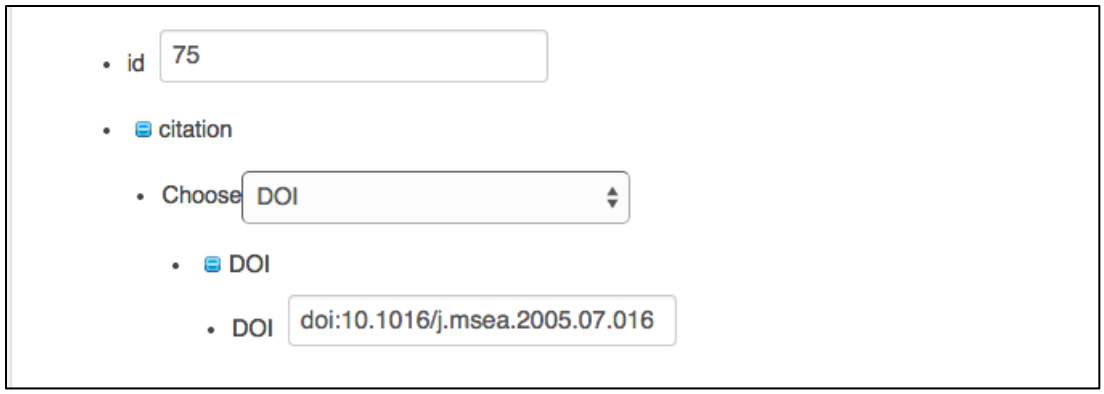
Next upload the corresponding micrograph (GE-DiffusionCouple-R88-IN100.tif)



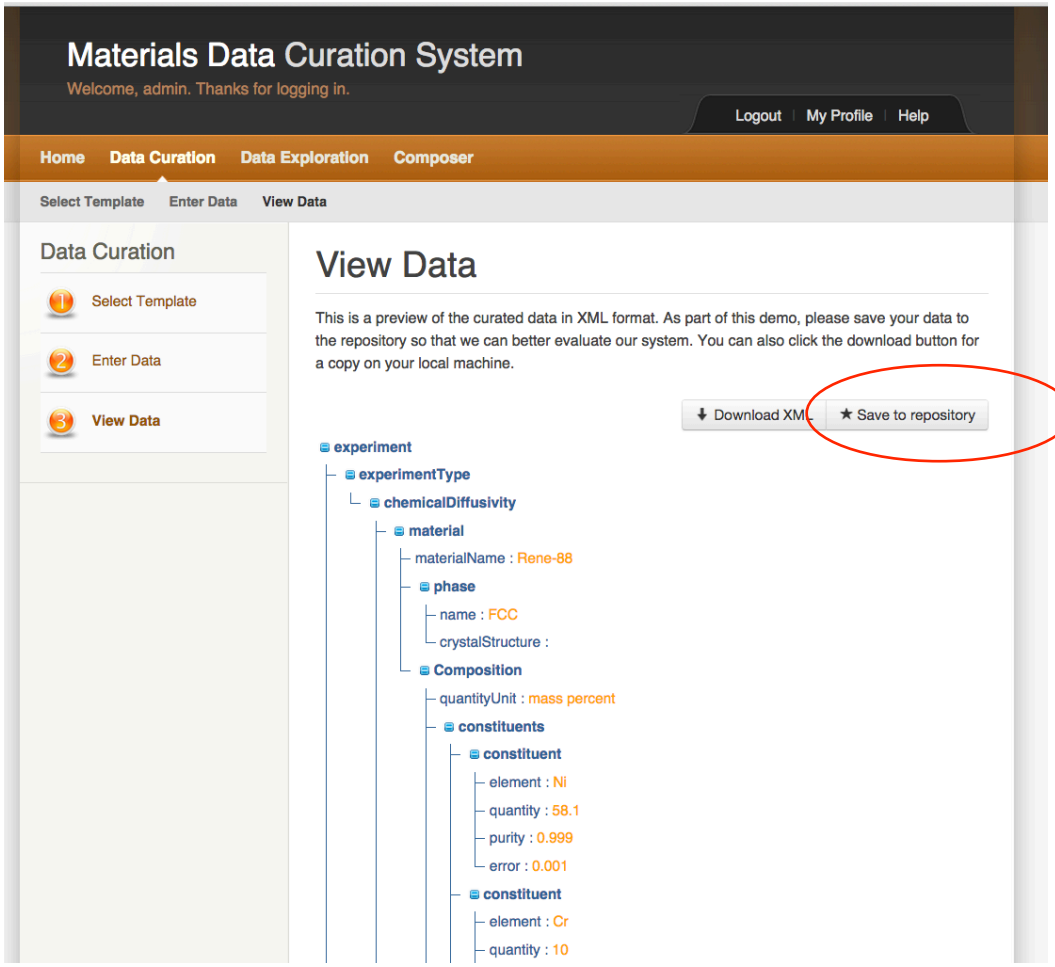
Once the file is upload, you should see a handle reference where the image is stored.

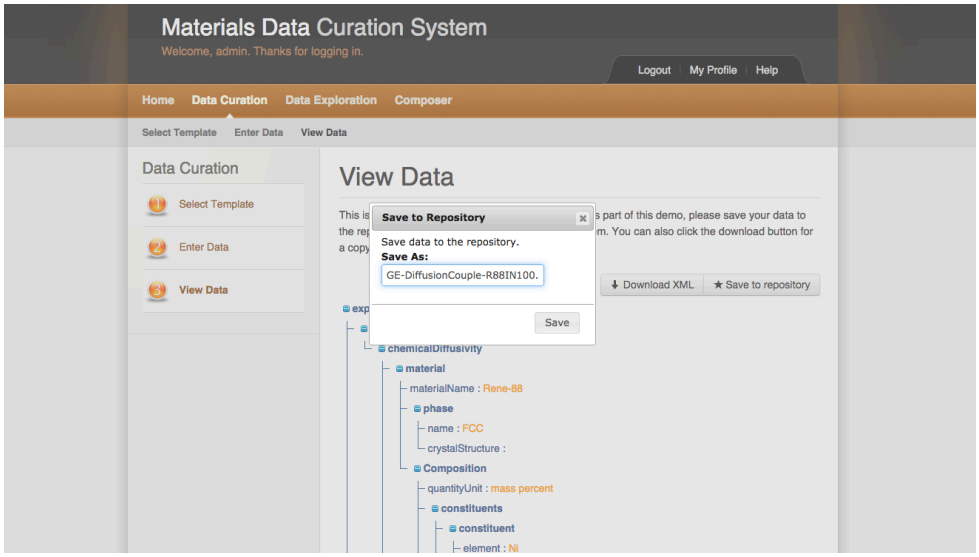


Enter a sample id and chose a citation reference:

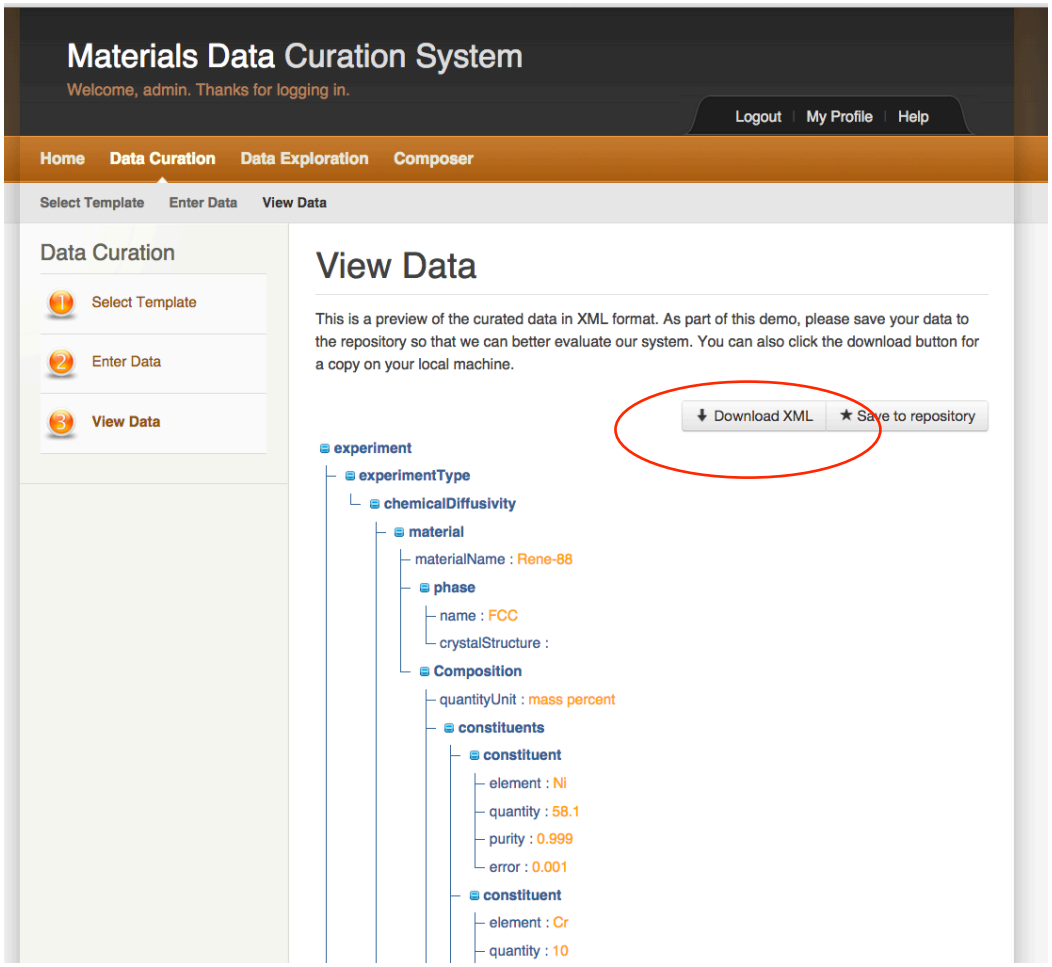


Now you can “View Data” (from the top left hand side menu) and chose to save it to the repository as “GE-DiffusionCouple-R88-IN100.xml.





You can also download a copy of the XML entry.



In the “Data Exploration” tutorial we will then view this data and export the spreadsheet.