Blender 2.49b
How to generate 3D-images?

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1 Installation

Blender can be download from the open source community website:
http://www.blender.org/download/get-blender/

Please check installation instructions there.
'Python' is not essential to generate 3D-images with 'Blender'.

2 Image and data preparation in Present

In Present open the txt-file with:
File → Open → choose your txt-file to import it.

Load two images, for instance Topo and UKelvin.

Export the Topo-image as STL-file: File → Export → Save as type: .StL

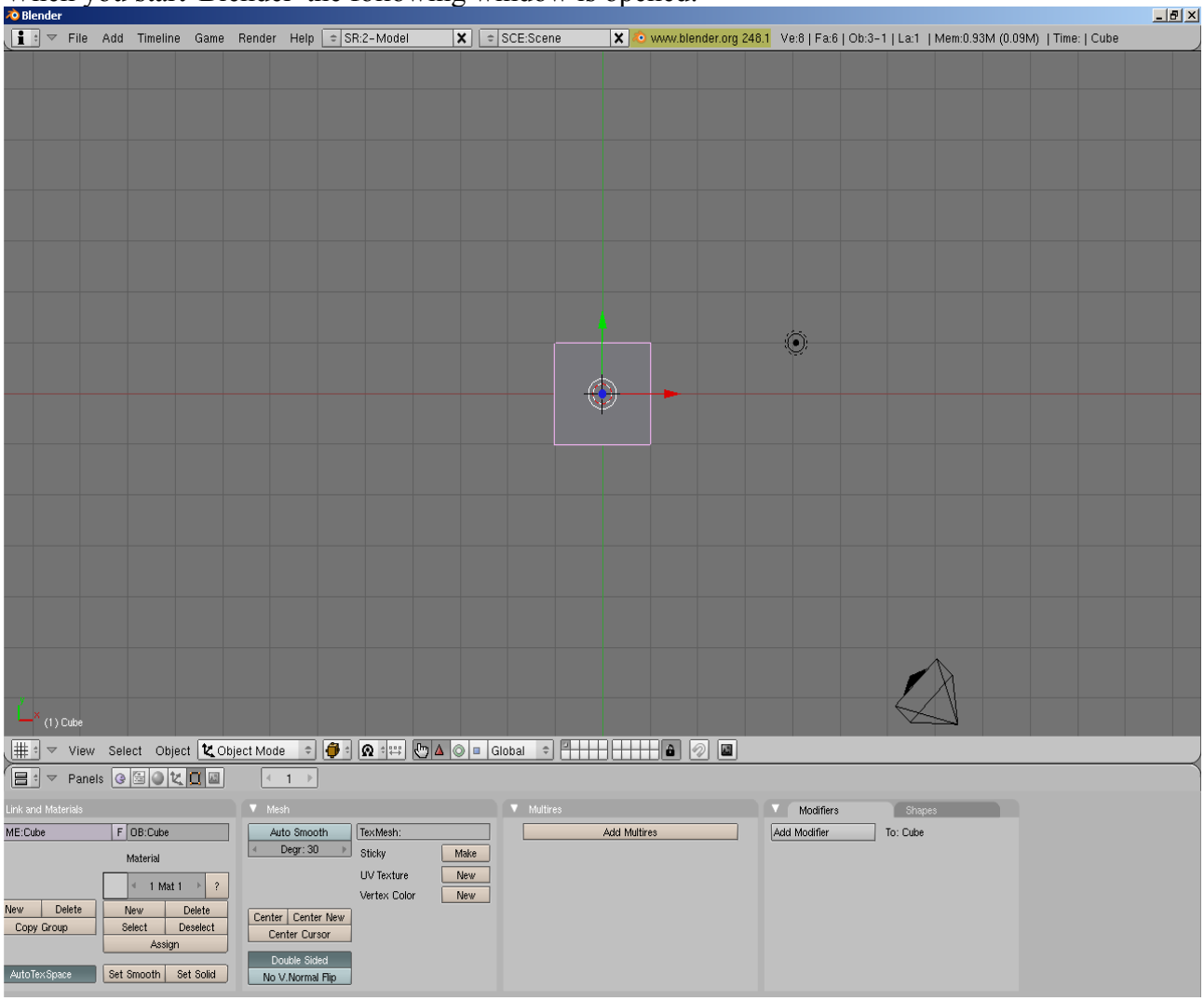
Save the UKelvin-image as JPEG-file: File → Save as → Save as type: .jpg

In 'Blender' the STL-file (Topo) is used to generate the 3D-image and the JPEG-file is used to colorize the image.

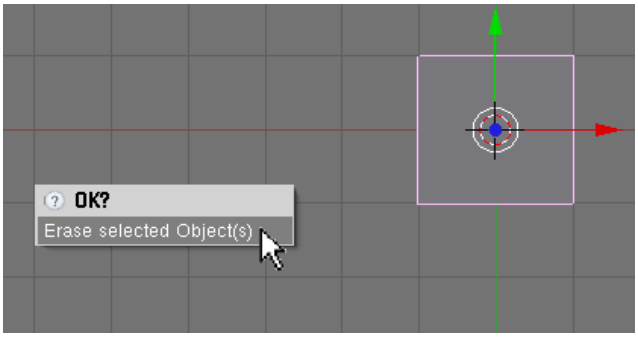
3 Blender Tutorial

3.1 Import of the STL-file

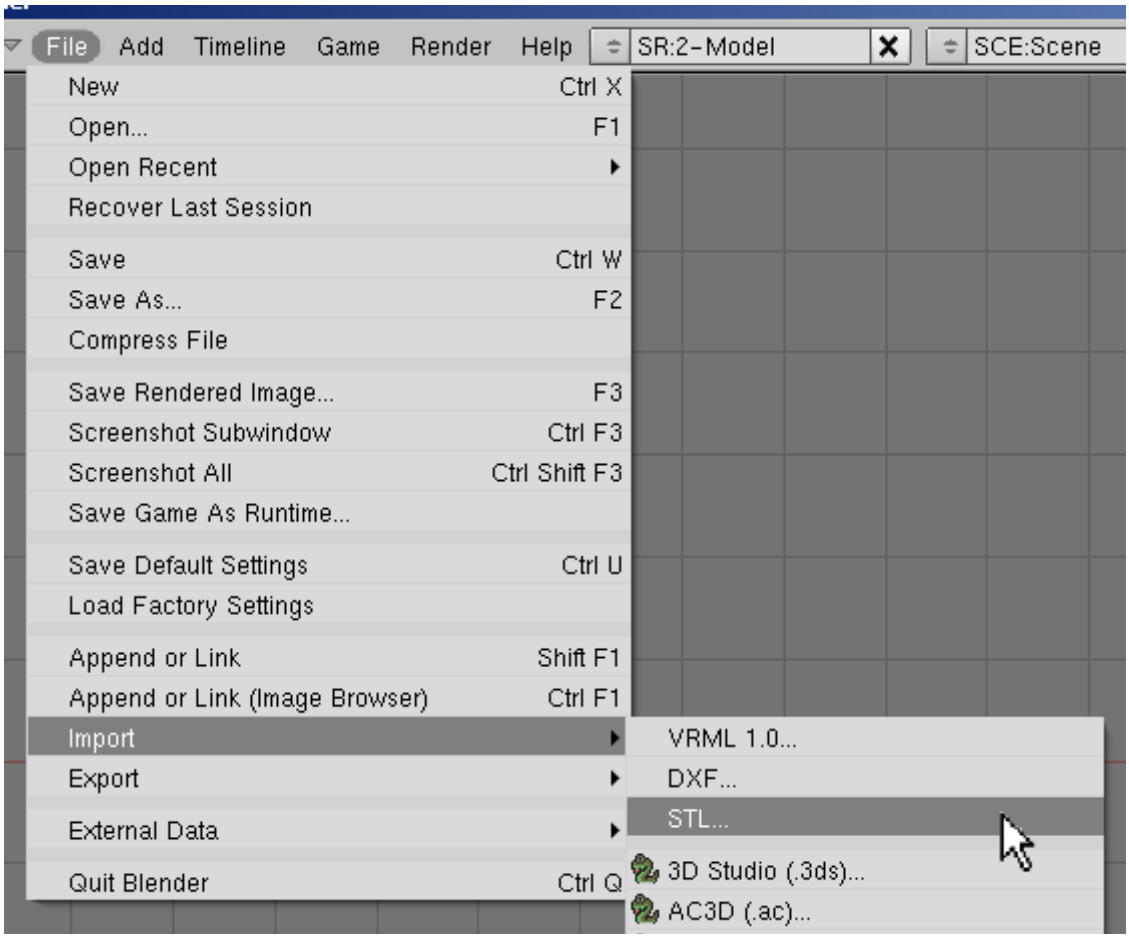
When you start 'Blender' the following window is opened:



Erase the cube with Entf (right mouse button) → Erase selected Object(s).



File → Import → STL... → choose your STL-file to import it.

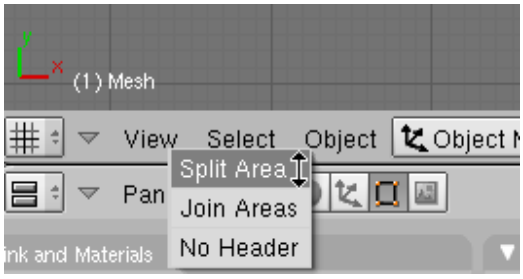


Your STL-object is called Mesh in 'Blender'.
If the Mesh is too big press N or Object → Transform Properties:
Press Link Scale (change X, Y, Z proportionally) and set DimX = 10; DimY and DimZ will be readjust automatically.
So, the whole Mesh should be visible.

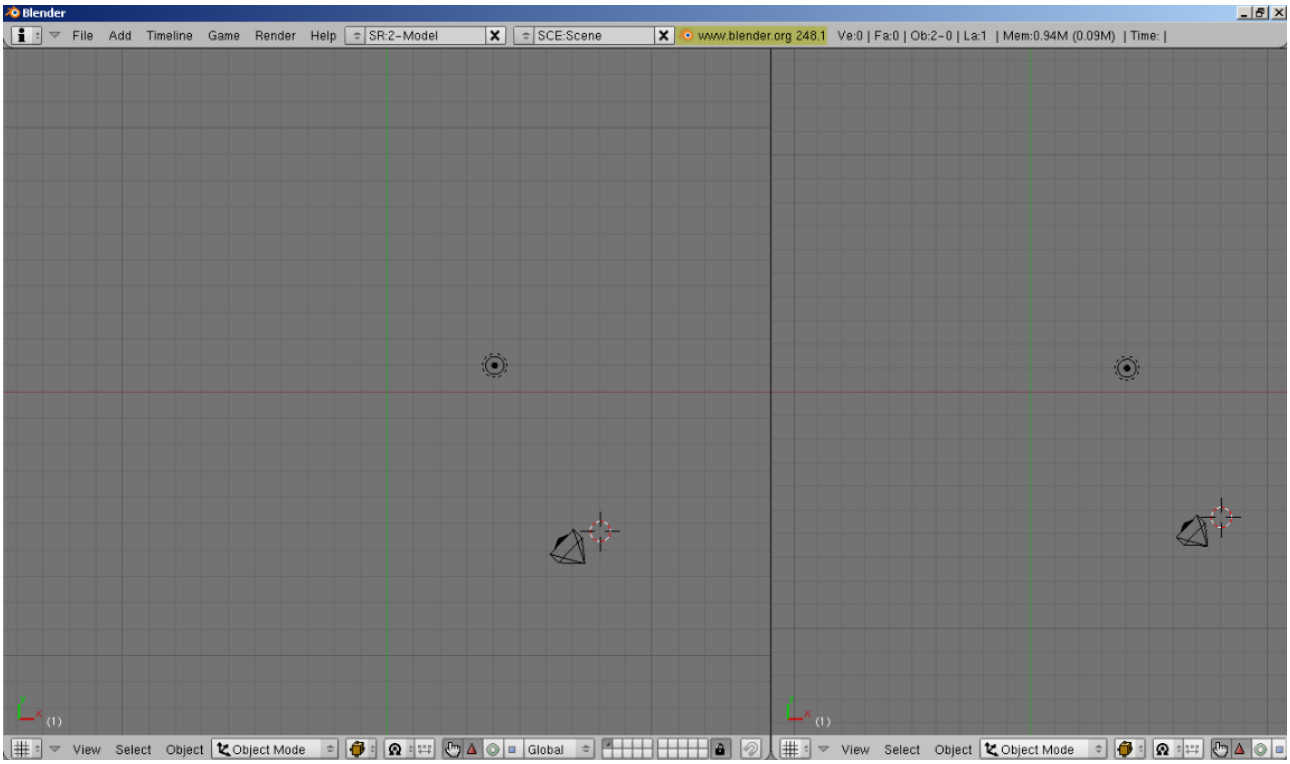
3.2 Creating a second window

To open a new window you have to right click on the black line between the upper and lower window-part. Your mouse should show the following arrow: 

Choose Split Area to create the second window.



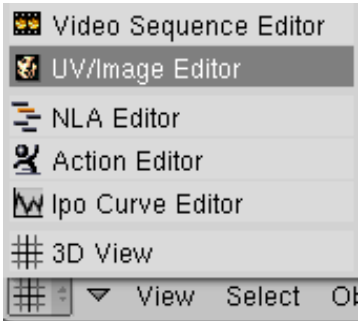
A movable grey line appear in the window. Set the grey line at the place where both windows have the desired size. Confirm your adjustment with one click left.



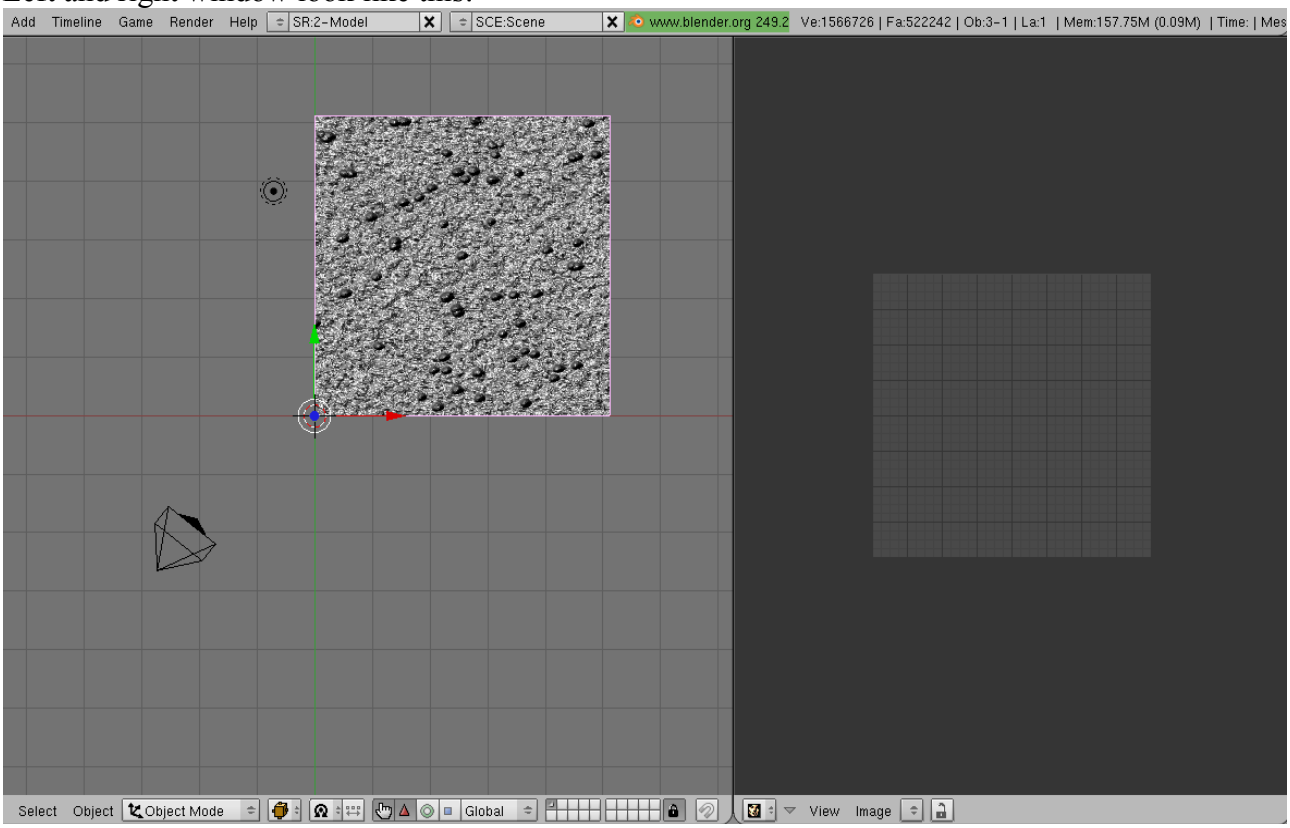
3.3 Import of the JPEG-image

Change the window type in the right window with following button: 

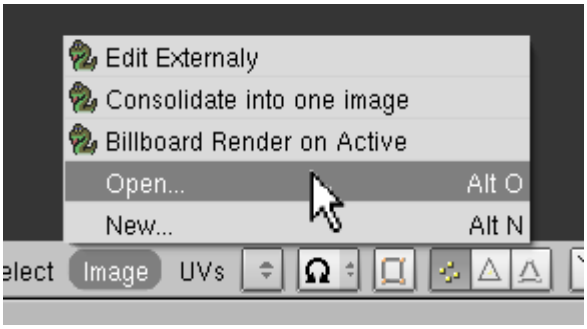
Choose the adjustment UV/Image Editor (Shift + F10).



Left and right window look like this:



To open the JPEG-image click in the right window on Image → Open... or press Alt + O.

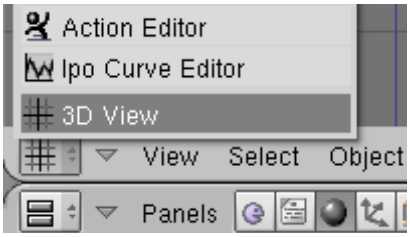


Please use images in JPEG-format, otherwise Blender doesn't open it perhaps.

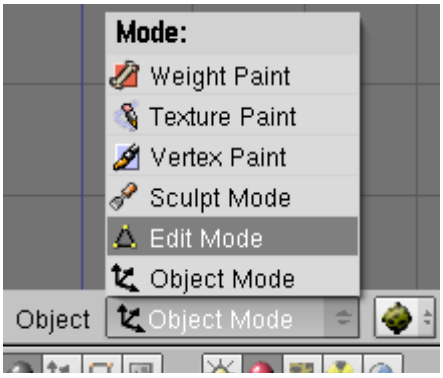
3.4 Project JPEG-image on the Mesh

Select your Mesh (left window) clicking with the right mouse button on it. The Mesh is selected if there is a pink line around it.

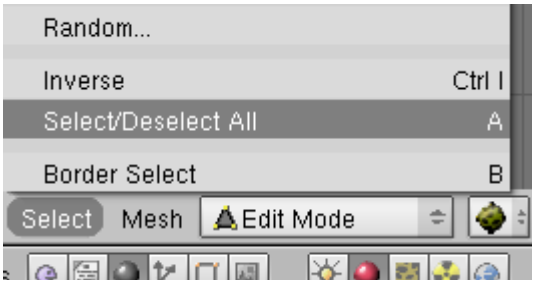
Choose the 3D View.



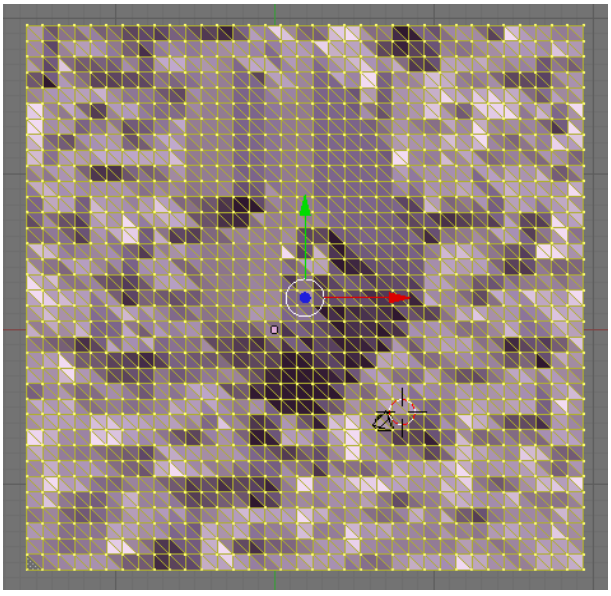
Click on Object Mode to choose the Edit Mode.



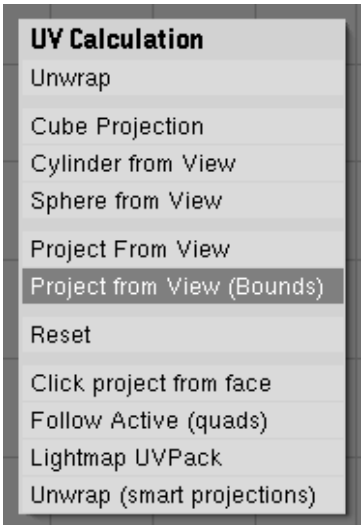
Select all with Select → Select/Deselect All or press A.



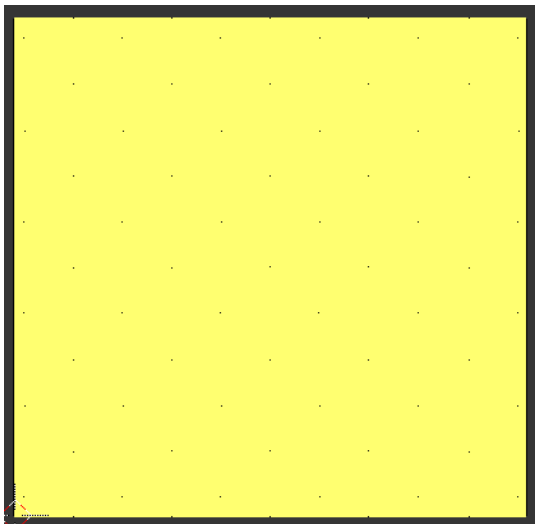
All corners and edges of your Mesh are shown in yellow.



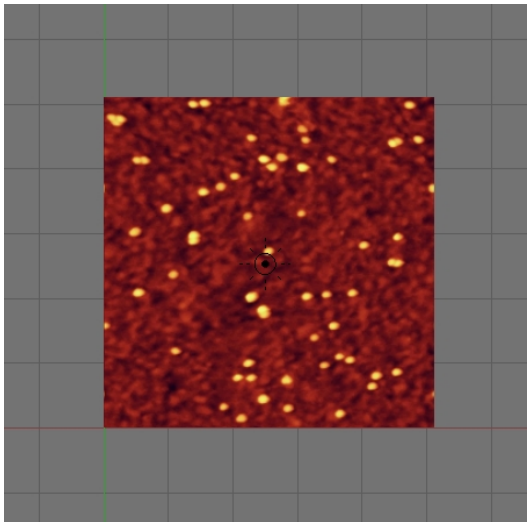
Press U (left window) and choose Project From View (Bounds).



Accordingly in the UV/Image Editor of the right window a consistent pattern of the image arise.

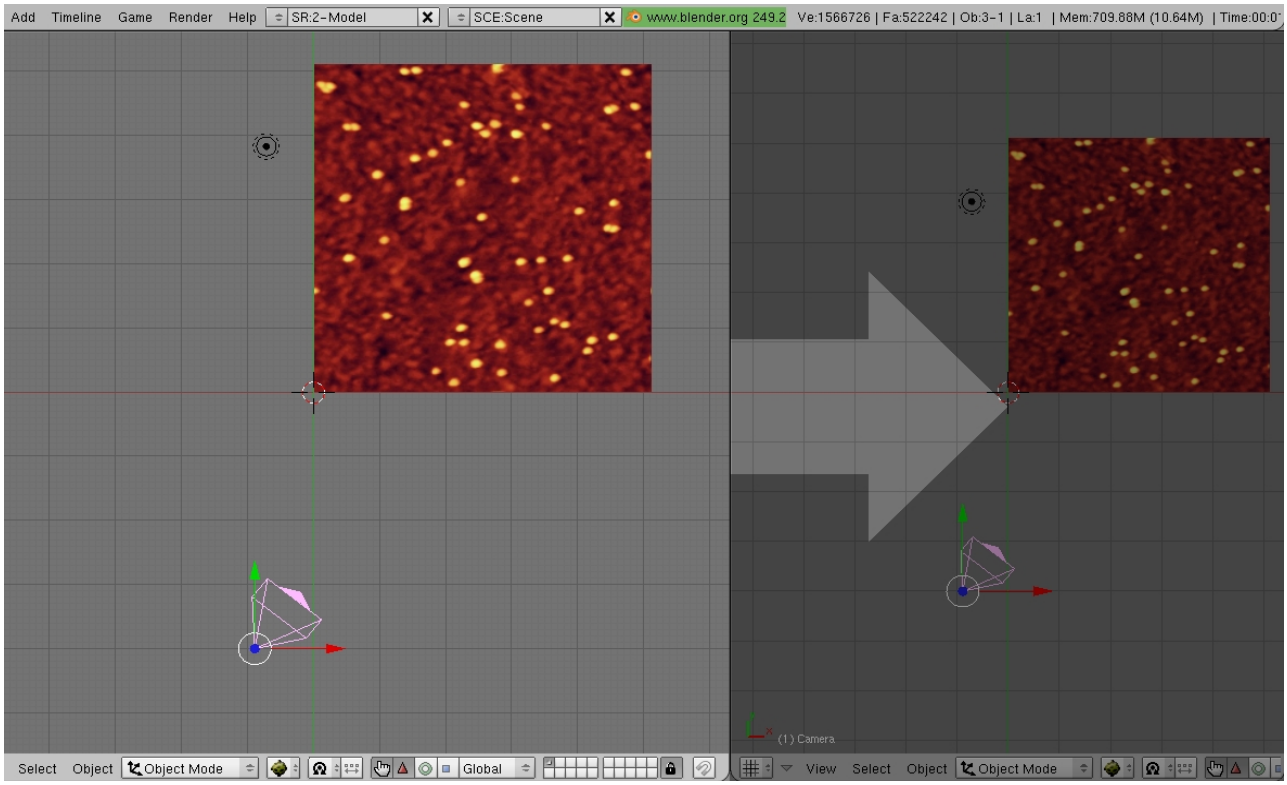


To project the image on the Mesh press Alt + Z. Change the left window into Object Mode.
Hence, the Mesh should become colored.



3.5 Editing the view of the Mesh

Close the right window. For this click with the right mouse button on the black line between the two windows and choose Join Areas. Select with the arrow which window should disappear. In this picture it is the right one:

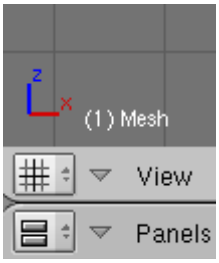


With the following instructions you got the possibility for editing the view of the Mesh in your own way.

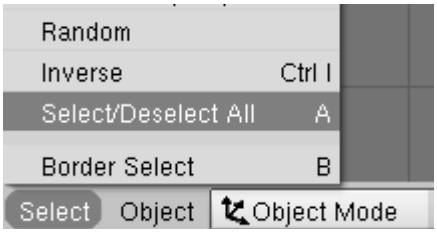
To select an object, the camera or the lamp press with the right mouse button on it.
→ In the Object Mode an object is selected if there is a pink line around it.
→ In the Edit Mode it is selected if the corners and edges are yellow.

In the bottom left corner you can see which object is selected:

- STL-object is called Mesh
- camera = Camera
- lamp = Lamp

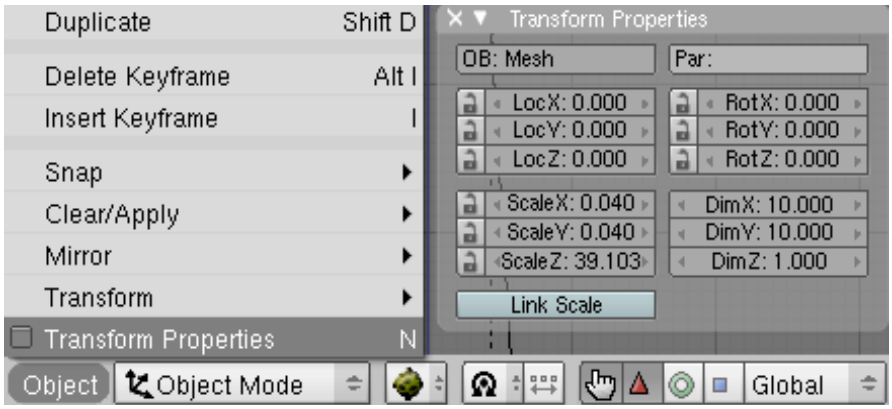


To select all objects (inclusive camera and lamp) press A or Select → Select/Deselect All.



Changing properties of the Mesh press N or Object → Transform Properties.

- LocX, Y, Z are in this example 0, so the bottom left corner of the mesh is in the middle of the net
- RotX, Y, Z define the rotation of the Mesh
- ScaleX, Y, Z and DimX, Y, Z show the size of the Mesh
- Link Scale can be used to change the size proportionally



With DimZ you can alter the Mesh in z-direction. The larger DimZ the larger become expansion in z-direction. If DimZ is “0” your Mesh is in 2D.

The numeric pad of your keyboard is used to change the perspective of Mesh, camera and lamp:

- G moves the object
- S increased or decreased the object
- R rotates the object
- 7 shows the top view
- 0 shows the camera view
- 1 shows the front, 3 one side
- 2 and 8 rotate the view up and down
- 4 and 6 rotate the view left and right
- Alt and left mouse button rotate the view over X, Y and Z
- F12 shows the Render view
- with + and – you can zoom, also possible with the mouse wheel

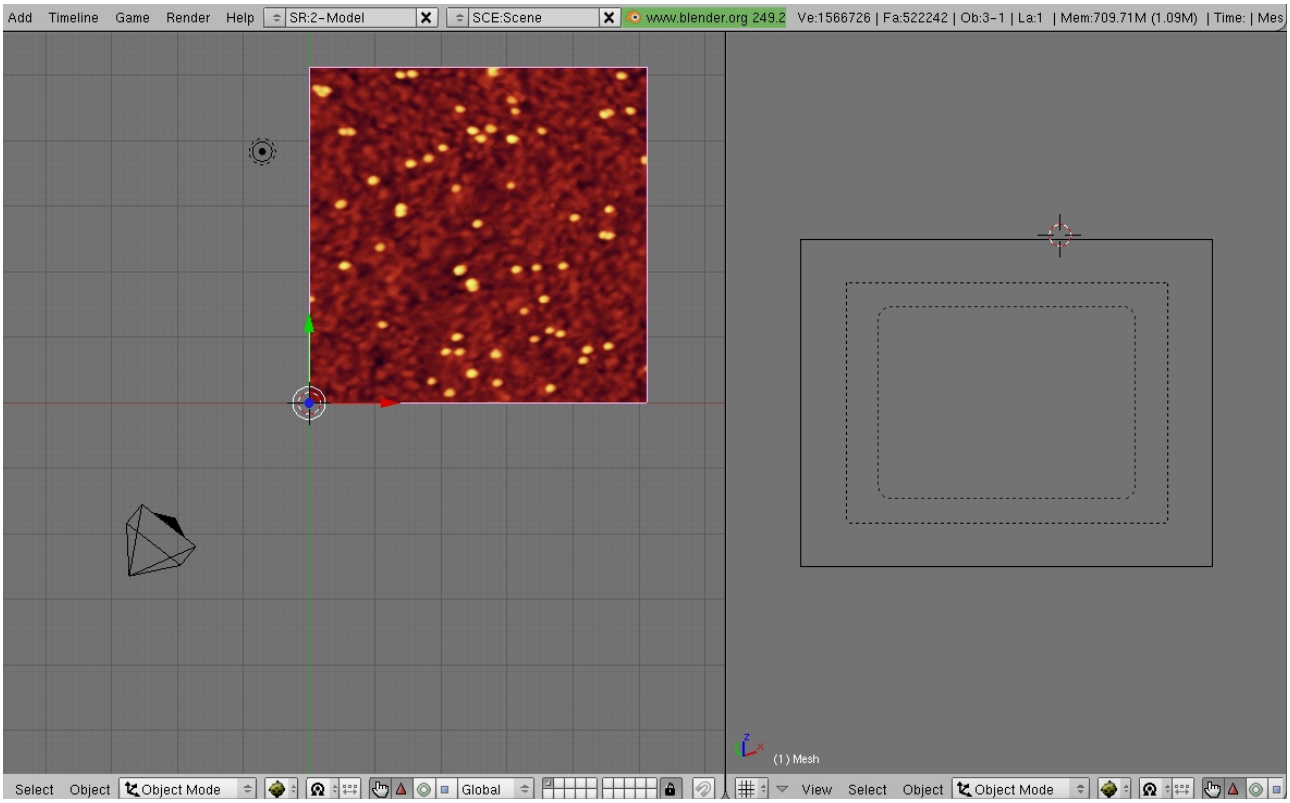
3.6 Adjustment of camera and lamp

At first create a new second window.

The right window should show the view through the camera (Press 0).
If the camera view only show a grey picture the camera isn't targeted on the object. If the camera-view only show a black picture the lamp is placed on the wrong site so that the object isn't illuminated.

The left window is used to change the camera and the lamp in the 3 planes (X, Y, Z). For this always take a look at the right window to check out the perfect view.

Maybe at first left and right window look like the following:

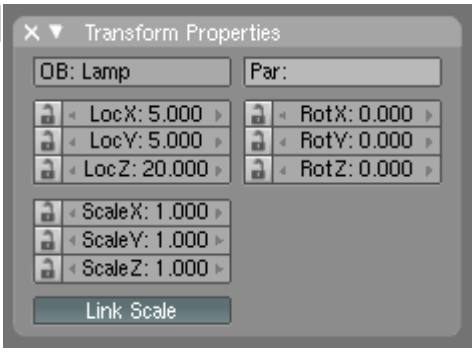


The left window show your Mesh in the top view (number 7). The camera view (number 0) in the right window only show a grey picture.

Try to find your Mesh through the camera view in the right window by correct positioning of camera and lamp in the left window. Use the following instructions and settings.

A short introduction for positioning of camera and lamp is given in “youtube”.

Select lamp with the right mouse button when the Object Mode is on. Movement of the lamp could be affected with G, S, R and the numeric pad of your keyboard. Changing properties could be done with Object → Transform Properties (N).
For a first positioning of the lamp transfer these properties.

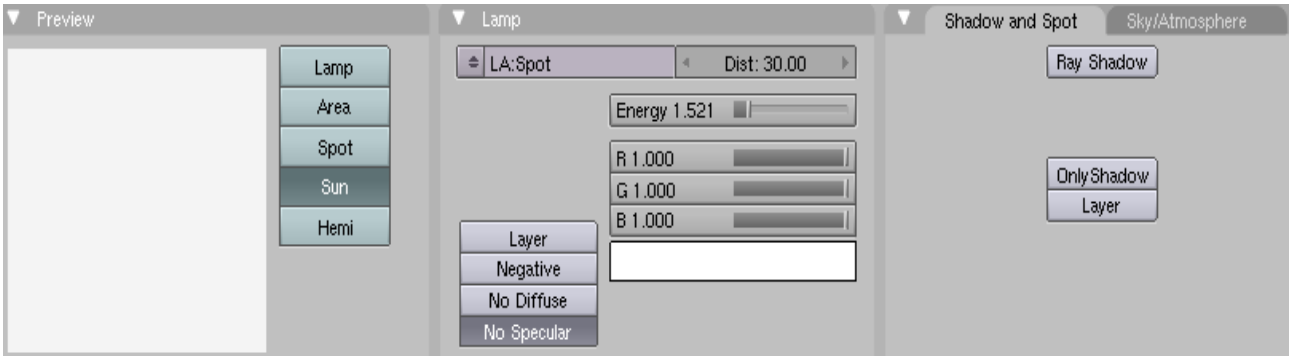


With F5 adjustments for the lamp could be done. There are five different lamp-typs:

- Lamp – creates an omnidirectional point light source; intensity decreases with higher distance
- Area – creates a directional area light source; capable for ambient light
- Spot – creates a directional cone light source; light is emitted in a specific direction
- Sun – creates a constant direction parallel ray light source; intensity is the same and light is emitted in a specific direction
- Hemi – creates a 180° constant light source

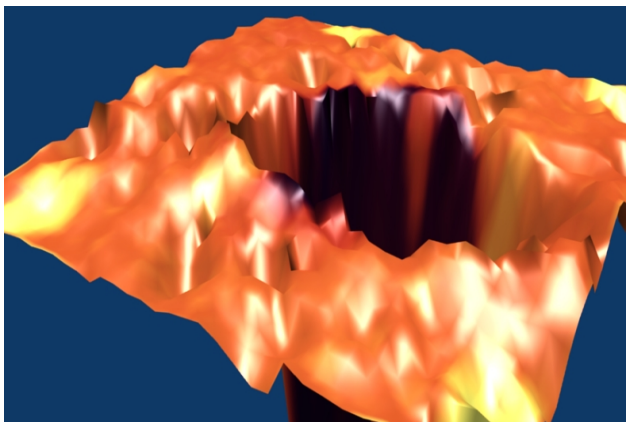
The window Preview shows the adjustment of the selected lamp.

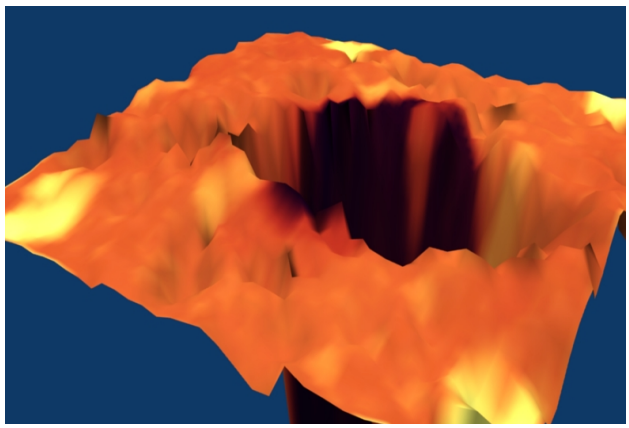
Choose the lamp-typ Sun with following adjustments:



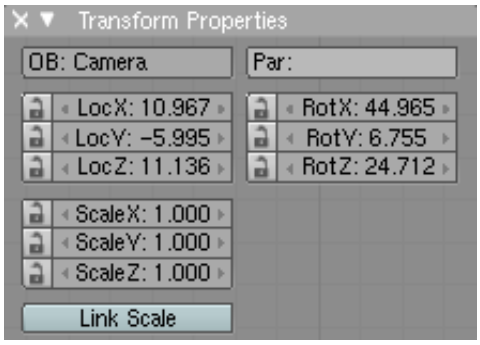
Explanation of some buttons:

- Energy – affects the intensity (**useful button making your rendered picture brighter or darker**)
- R, G, B – affects the colors red, green and blue (if necessary)
- Ray Shadow – shadows are shown (if necessary)
- No Specular – luminescent areas vanish like the following pictures show:

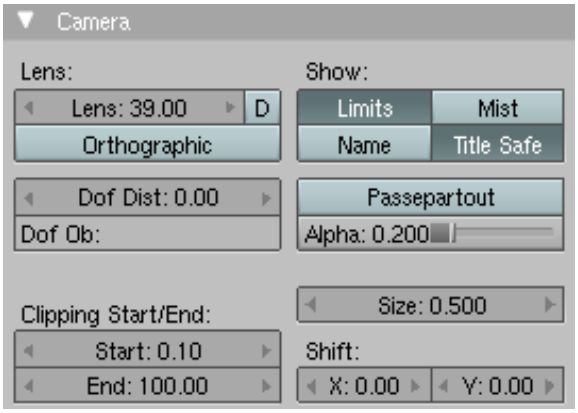




Select camera with the right mouse button when the Object Mode is on. Movements could be affected with G, S, R and the numeric pad of your keyboard. Changing properties could be done with Object → Transform Properties (N).
For a first positioning of the camera transfer these properties.



With F9 adjustments for the camera could be done. Transfer the following setting:

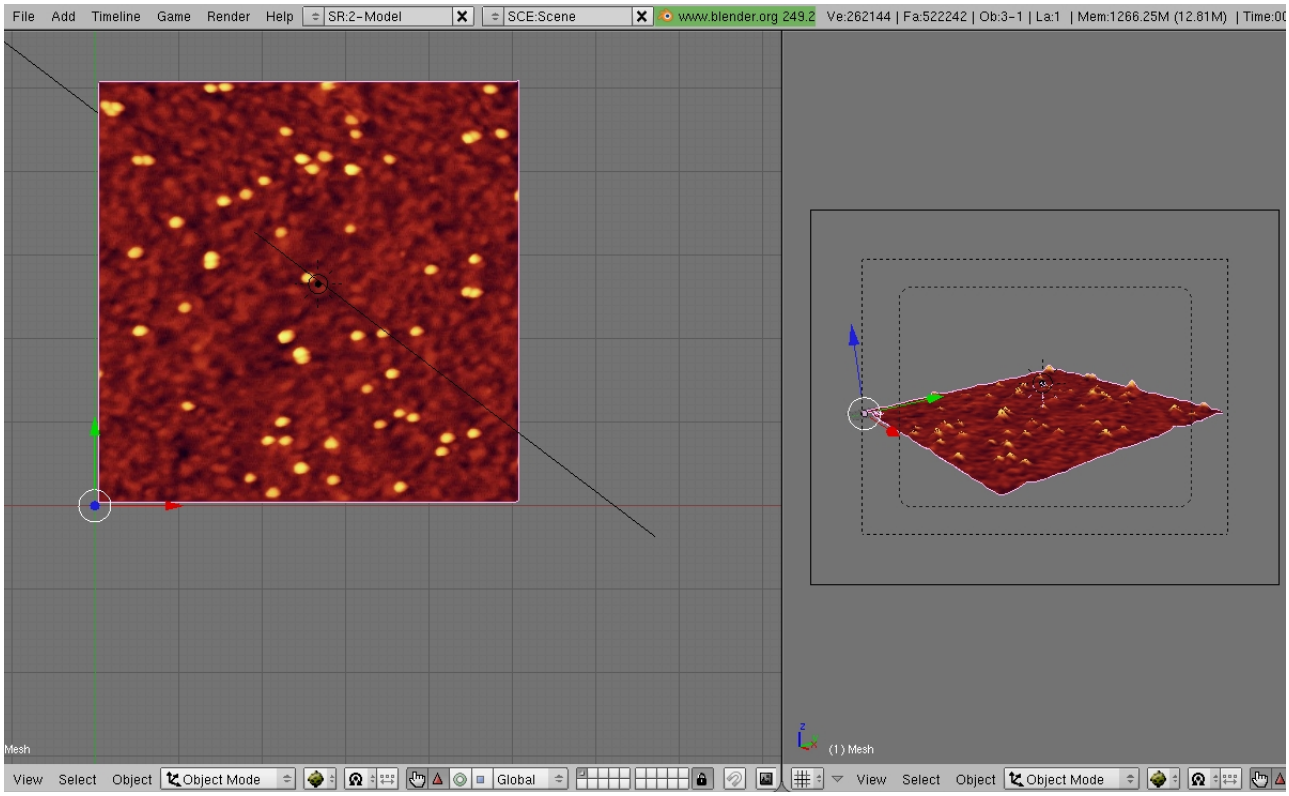


Explanation of some buttons:

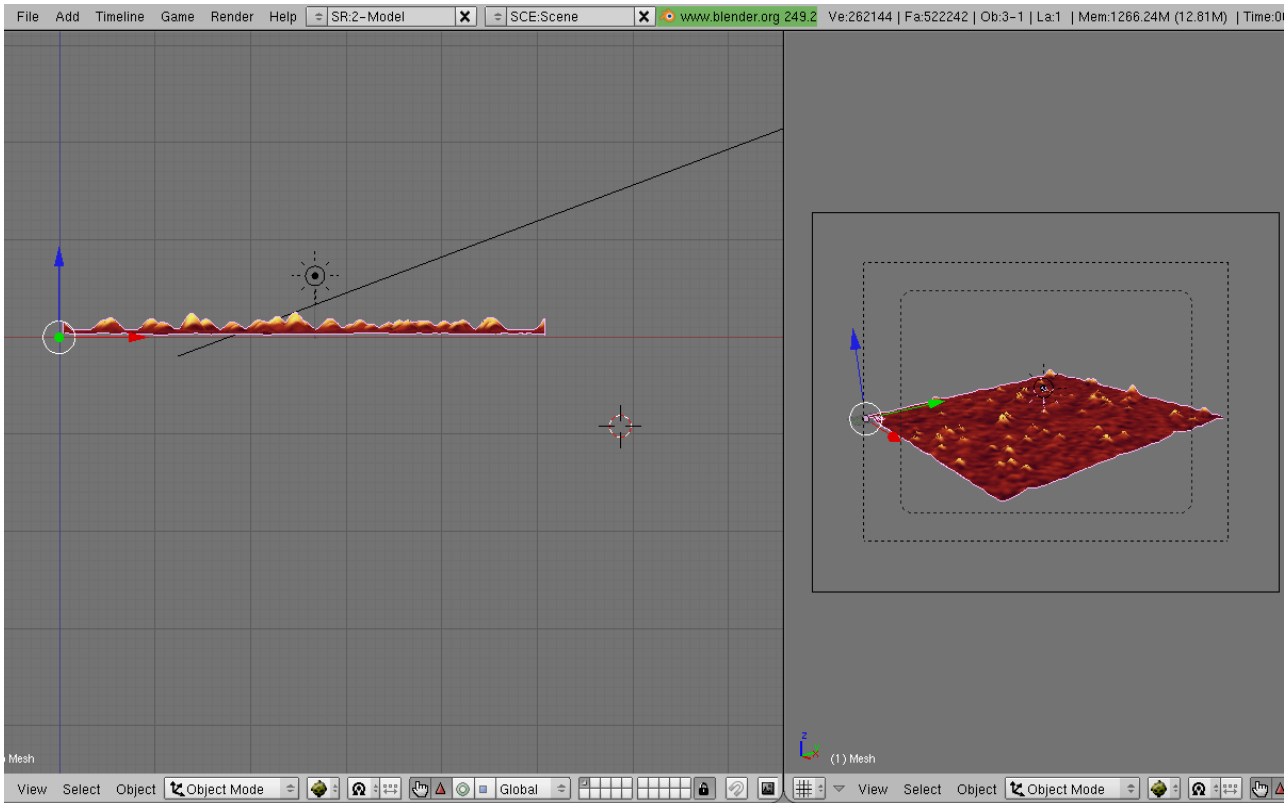
- Lens – affects the magnification; the larger the value the nearer the view
- Clipping Start/End – affects the range of the camera that means which parts of the object are rendered
- Limits – angle of view and range of the camera are shown

The top view (number 7) and the front view (number 1) give an overview where camera and lamp are located.

Left and right window should look like the following after a successful positioning:



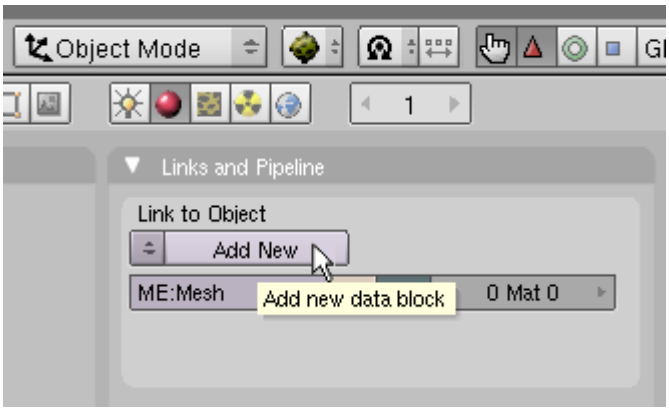
The left window show the top view of the Mesh (number 7). The lamp is positioned in the middle over the Mesh. The dashed line indicates the direction of the camera view. The right window show the view through the camera (number 0).



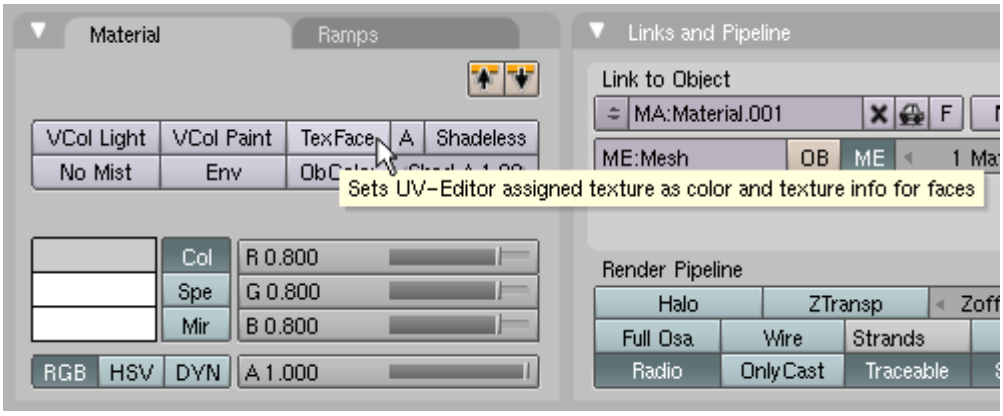
The left window show the front view of the Mesh (number 1). With this view you can also change the distance between lamp and Mesh.

If you are ready positioning camera and lamp press F12 to take a look at the rendered picture. As you can see it is without any color.

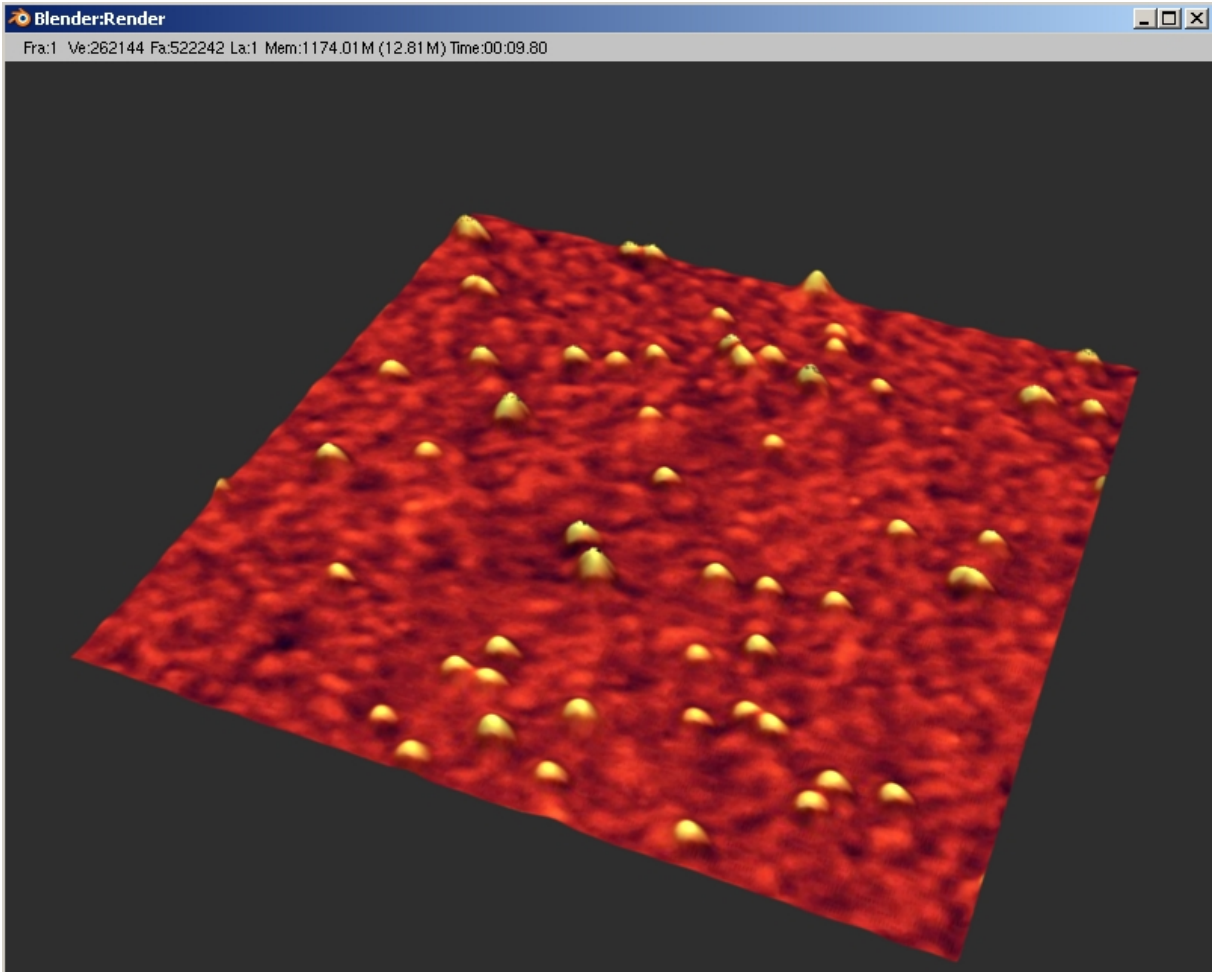
To colorize the Render view select the Mesh in the left window. Press F5 in the Buttons window and click on Add New in the Links and Pipeline panel.



Click on Tex Face in the Material panel.



The colorized rendered picture look like this:



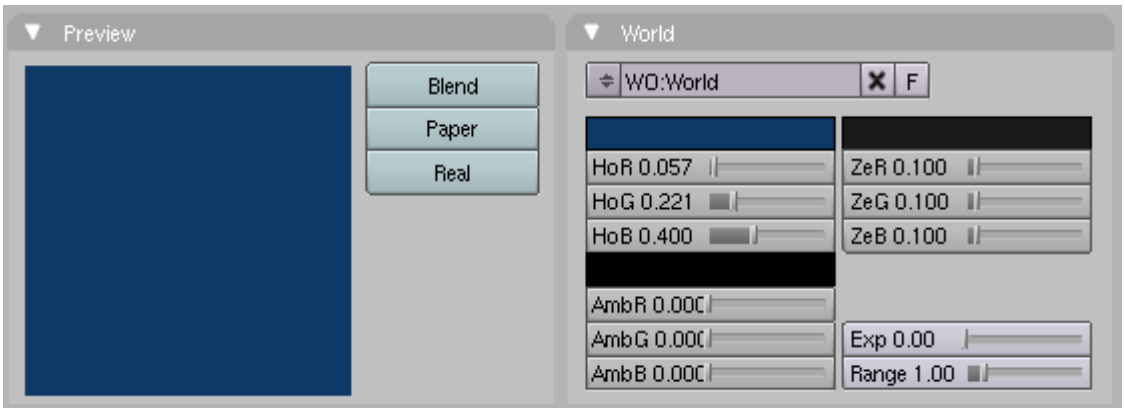
If the rendered picture is too dark, select the lamp, press F5 and increase the value for energy.

Save the rendered picture with F3.

3.7 How to improve the quality of the rendered picture?

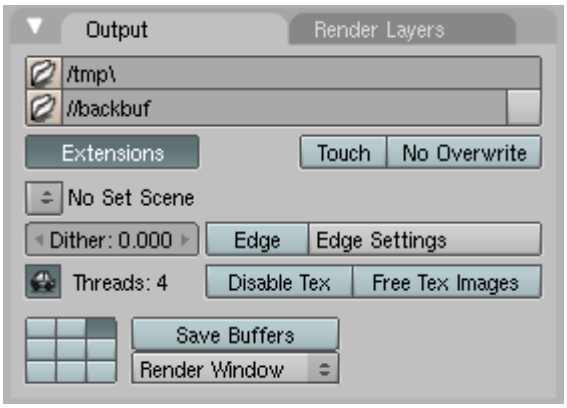
For the improvement of the quality close the Render view. Select the Mesh testing the following settings. After each setting check with the Render view (F12) if it really improves your picture-quality.

The background color could be changed with F5. Press F5 a few times till following setting is opened:



for grey: HoR 0.204
HoG 0.204
HoB 0.204

In the Render settings (F10) you can also use an image as background.
Instead of //backbuf you can insert your own image.
Set a checkmark behind the file-name.

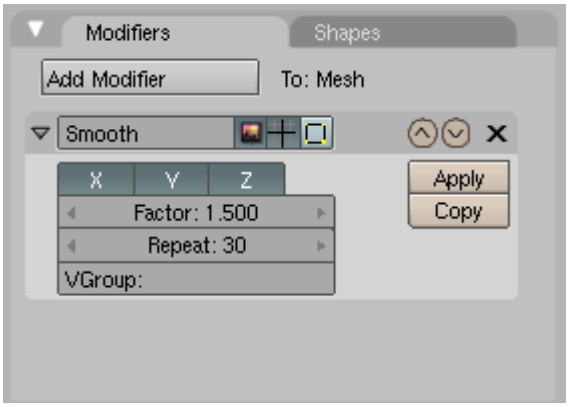


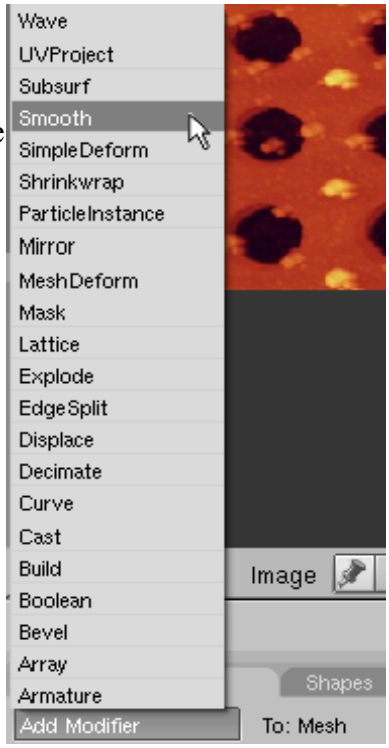
To smooth your Mesh tab into Edit Mode and press W.
In this menu choose Remove Doubles to erase unnecessary corners.
Afterwards choose Set Smooth to erase edges and make the surface smooth.

F9 opens the panel where you can add a modifier, for example Smooth.

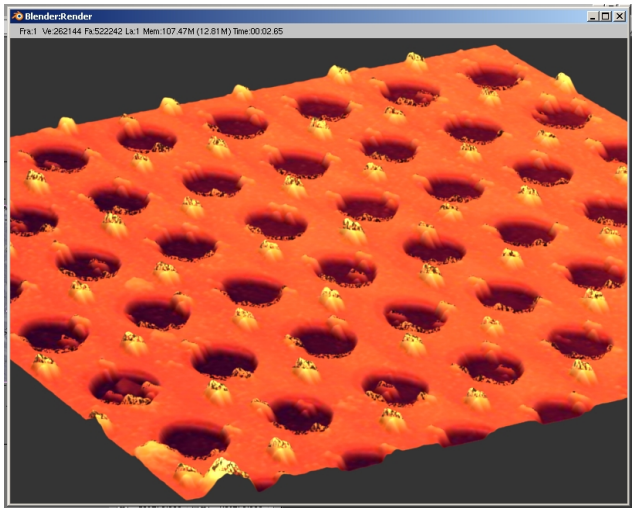
Add Modifier → Smooth

Transfer the following setting to adjust Factor and Repeat which make your Mesh smoother.

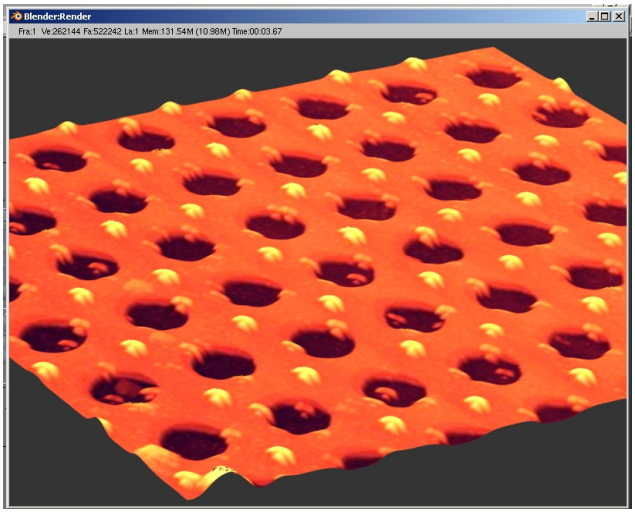




before modifying



after modifying



F5 opens a panel where you can alter reflection and transparency.

Left column:
Ray Mirror switches the reflection on and off
Ray Mir affects the power of the reflection
Fresnel affects the dependence of the angle of view
Fac regulates how strong Fresnel take effect
Gloss changes the gloss of the surface
Depth affects the number of reflections (how many times a beam is reflected)

Right column:
Ray Transp switches the transparency on and off
IOR equates to refraction index of the material
Fresnel affects the angle dependence
Fac regulates how strong Fresnel take effect
Gloss affects how focused or out of focus refractions are