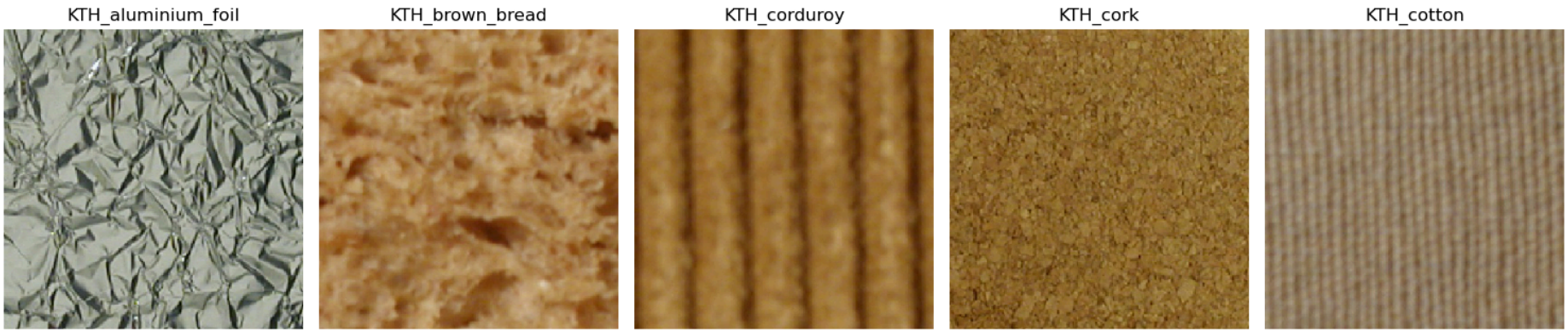
In [1]:
```
import os
import matplotlib.pyplot as plt
from PIL import Image

# Set the path to the directory where the dataset is stored
dataset_directory = 'C:\\Users\\Aishwariya\\Downloads\\Splited\\train'

# Initialize a counter for the number of classes processed
num_classes = 0

# Initialize a figure for plotting
plt.figure(figsize=(15, 10))

# Display one image from each class in both vertical and horizontal orientations
for class_name in os.listdir(dataset_directory):
    class_dir = os.path.join(dataset_directory, class_name)

    # Check if it's a directory
    if os.path.isdir(class_dir):
        # Get the first image in the directory
        image_name = os.listdir(class_dir)[0]
        image_path = os.path.join(class_dir, image_name)

        # Load the image
        image = Image.open(image_path)

        # Increment the class counter
        num_classes += 1

        # Add a subplot for the original image
        plt.subplot(2, 5, num_classes)
        plt.imshow(image)
        plt.title(class_name)
        plt.axis('off')

        # Check if we have processed 5 classes
        if num_classes == 5:
            break

# Adjust subplot parameters for a nicer layout
plt.tight_layout()
plt.show()
```



In [2]:
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!pip install tensorflow
```

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Requirement already satisfied: tensorflow in c:\users\aishwariya\anaconda3\lib\site-packages (2.15.0)
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15.0)
Requirement already satisfied: absl-py>=1.0.0 in c:\users\aishwariya\anaconda3\lib\site-packages (from tensorflow-intel==2.15.0-
>tensorflow) (2.0.0)
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5.0->tensorflow) (1.6.3)
Requirement already satisfied: flatbuffers>=23.5.26 in c:\users\aishwariya\anaconda3\lib\site-packages (from tensorflow-intel==
2.15.0->tensorflow) (23.5.26)
Requirement already satisfied: gast!=0.5.0,!=0.5.1,!=0.5.2,>=0.2.1 in c:\users\aishwariya\anaconda3\lib\site-packages (from tens
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Requirement already satisfied: google-pasta>=0.1.1 in c:\users\aishwariya\anaconda3\lib\site-packages (from tensorflow-intel==2.
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nsorflow) (3.7.0)
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Requirement already satisfied: opt-einsum>=2.3.2 in c:\users\aishwariya\anaconda3\lib\site-packages (from tensorflow-intel==2.1
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Requirement already satisfied: packaging in c:\users\aishwariya\anaconda3\lib\site-packages (from tensorflow-intel==2.15.0->tens
orflow) (23.0)
Requirement already satisfied: protobuf!=4.21.0,!=4.21.1,!=4.21.2,!=4.21.3,!=4.21.4,!=4.21.5,<5.0.0dev,>=3.20.3 in c:\users\aish
wariya\anaconda3\lib\site-packages (from tensorflow-intel==2.15.0->tensorflow) (4.21.12)
Requirement already satisfied: setuptools in c:\users\aishwariya\anaconda3\lib\site-packages (from tensorflow-intel==2.15.0->ten
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nsorflow) (1.16.0)
Requirement already satisfied: termcolor>=1.1.0 in c:\users\aishwariya\anaconda3\lib\site-packages (from tensorflow-intel==2.15.
0->tensorflow) (2.4.0)
Requirement already satisfied: typing-extensions>=3.6.6 in c:\users\aishwariya\anaconda3\lib\site-packages (from tensorflow-inte
l==2.15.0->tensorflow) (4.7.1)
Requirement already satisfied: wrapt<1.15,>=1.11.0 in c:\users\aishwariya\anaconda3\lib\site-packages (from tensorflow-intel==2.
15.0->tensorflow) (1.14.1)
Requirement already satisfied: tensorflow-io-gcs-filesystem>=0.23.1 in c:\users\aishwariya\anaconda3\lib\site-packages (from ten
sorflow-intel==2.15.0->tensorflow) (0.31.0)
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==2.15.0->tensorflow) (2.15.1)
Requirement already satisfied: tensorflow-estimator<2.16,>=2.15.0 in c:\users\aishwariya\anaconda3\lib\site-packages (from tenso
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```
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Requirement already satisfied: keras<2.16,>=2.15.0 in c:\users\aishwariya\anaconda3\lib\site-packages (from tensorflow-intel==2.
15.0->tensorflow) (2.15.0)
Requirement already satisfied: wheel<1.0,>=0.23.0 in c:\users\aishwariya\anaconda3\lib\site-packages (from astunparse>=1.6.0->te
nsorflow-intel==2.15.0->tensorflow) (0.38.4)
Requirement already satisfied: google-auth<3,>=1.6.3 in c:\users\aishwariya\anaconda3\lib\site-packages (from tensorboard<2.16,>
=2.15->tensorflow-intel==2.15.0->tensorflow) (2.25.2)
Requirement already satisfied: google-auth-oauthlib<2,>=0.5 in c:\users\aishwariya\anaconda3\lib\site-packages (from tensorboard
<2.16,>=2.15->tensorflow-intel==2.15.0->tensorflow) (1.2.0)
Requirement already satisfied: markdown>=2.6.8 in c:\users\aishwariya\anaconda3\lib\site-packages (from tensorboard<2.16,>=2.15-
>tensorflow-intel==2.15.0->tensorflow) (3.4.1)
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2.15->tensorflow-intel==2.15.0->tensorflow) (2.31.0)
Requirement already satisfied: tensorboard-data-server<0.8.0,>=0.7.0 in c:\users\aishwariya\anaconda3\lib\site-packages (from te
nsorboard<2.16,>=2.15->tensorflow-intel==2.15.0->tensorflow) (0.7.2)
Requirement already satisfied: werkzeug>=1.0.1 in c:\users\aishwariya\anaconda3\lib\site-packages (from tensorboard<2.16,>=2.15-
>tensorflow-intel==2.15.0->tensorflow) (2.2.3)
Requirement already satisfied: cachetools<6.0,>=2.0.0 in c:\users\aishwariya\anaconda3\lib\site-packages (from google-auth<3,>=
1.6.3->tensorboard<2.16,>=2.15->tensorflow-intel==2.15.0->tensorflow) (5.3.2)
Requirement already satisfied: pyasn1-modules>=0.2.1 in c:\users\aishwariya\anaconda3\lib\site-packages (from google-auth<3,>=1.
6.3->tensorboard<2.16,>=2.15->tensorflow-intel==2.15.0->tensorflow) (0.2.8)
Requirement already satisfied: rsa<5,>=3.1.4 in c:\users\aishwariya\anaconda3\lib\site-packages (from google-auth<3,>=1.6.3->ten
sorboard<2.16,>=2.15->tensorflow-intel==2.15.0->tensorflow) (4.9)
Requirement already satisfied: requests-oauthlib>=0.7.0 in c:\users\aishwariya\anaconda3\lib\site-packages (from google-auth-oau
thlib<2,>=0.5->tensorboard<2.16,>=2.15->tensorflow-intel==2.15.0->tensorflow) (1.3.1)
Requirement already satisfied: charset-normalizer<4,>=2 in c:\users\aishwariya\anaconda3\lib\site-packages (from requests<3,>=2.
21.0->tensorboard<2.16,>=2.15->tensorflow-intel==2.15.0->tensorflow) (2.0.4)
Requirement already satisfied: idna<4,>=2.5 in c:\users\aishwariya\anaconda3\lib\site-packages (from requests<3,>=2.21.0->tensor
board<2.16,>=2.15->tensorflow-intel==2.15.0->tensorflow) (3.4)
Requirement already satisfied: urllib3<3,>=1.21.1 in c:\users\aishwariya\anaconda3\lib\site-packages (from requests<3,>=2.21.0->
tensorboard<2.16,>=2.15->tensorflow-intel==2.15.0->tensorflow) (1.26.16)
Requirement already satisfied: certifi>=2017.4.17 in c:\users\aishwariya\anaconda3\lib\site-packages (from requests<3,>=2.21.0->
tensorboard<2.16,>=2.15->tensorflow-intel==2.15.0->tensorflow) (2023.7.22)
Requirement already satisfied: MarkupSafe>=2.1.1 in c:\users\aishwariya\anaconda3\lib\site-packages (from werkzeug>=1.0.1->tenso
rboard<2.16,>=2.15->tensorflow-intel==2.15.0->tensorflow) (2.1.1)
Requirement already satisfied: pyasn1<0.5.0,>=0.4.6 in c:\users\aishwariya\anaconda3\lib\site-packages (from pyasn1-modules>=0.
2.1->google-auth<3,>=1.6.3->tensorboard<2.16,>=2.15->tensorflow-intel==2.15.0->tensorflow) (0.4.8)
Requirement already satisfied: oauthlib>=3.0.0 in c:\users\aishwariya\anaconda3\lib\site-packages (from requests-oauthlib>=0.7.0
->google-auth-oauthlib<2,>=0.5->tensorboard<2.16,>=2.15->tensorflow-intel==2.15.0->tensorflow) (3.2.2)
```

In [3]:
```
!pip install keras
```

```
Requirement already satisfied: keras in c:\users\aishwariya\anaconda3\lib\site-packages (2.15.0)
```

In [4]:
```
import os
import numpy as np
import matplotlib.pyplot as plt
from PIL import Image
from tensorflow.keras.applications.vgg16 import VGG16, preprocess_input
from tensorflow.keras.preprocessing import image
from sklearn.metrics.pairwise import cosine_similarity

# Set the path to the directory where the dataset is stored
dataset_directory = 'C:\\Users\\Aishwariya\\Downloads\\Splited\\train'
valid_directory = 'C:\\Users\\Aishwariya\\Downloads\\Splited\\valid'

# Load pre-trained VGG16 model
base_model = VGG16(weights='imagenet', include_top=False)

def extract_features(image_path):
    img = image.load_img(image_path, target_size=(224, 224))
    img_array = image.img_to_array(img)
    img_array = np.expand_dims(img_array, axis=0)
    img_array = preprocess_input(img_array)
    features = base_model.predict(img_array)
    features = features.flatten()  # Flatten the feature representation
    return features

# Extract features from the images in the 'train' folder
train_features = {}
for class_name in os.listdir(dataset_directory):
    class_dir = os.path.join(dataset_directory, class_name)

    if os.path.isdir(class_dir):
        image_name = os.listdir(class_dir)[0]
        image_path = os.path.join(class_dir, image_name)

        train_features[class_name] = extract_features(image_path)

# Extract features from the images in the 'valid' folder
valid_features = {}
for class_name in os.listdir(valid_directory):
    class_dir = os.path.join(valid_directory, class_name)

    if os.path.isdir(class_dir):
        image_name = os.listdir(class_dir)[0]
        image_path = os.path.join(class_dir, image_name)
```

```
        valid_features[class_name] = extract_features(image_path)

# Function to find the most similar images using cosine similarity
def find_similar_images(query_features, dataset_features):
    similarities = {}
    for class_name, features in dataset_features.items():
        similarity = cosine_similarity([query_features], [features])[0][0]
        similarities[class_name] = similarity
    return similarities

# Choose a random image from the 'valid' folder for demonstration
query_class = np.random.choice(list(valid_features.keys()))
query_image_path = os.path.join(valid_directory, query_class, os.listdir(os.path.join(valid_directory, query_class))[0])
query_features = extract_features(query_image_path)

# Find similar images in the 'train' folder
similarities = find_similar_images(query_features, train_features)

# Sort the results by similarity
sorted_results = sorted(similarities.items(), key=lambda x: x[1], reverse=True)

# Display the query image and the top similar images
plt.figure(figsize=(15, 5))
plt.subplot(1, 6, 1)
plt.imshow(Image.open(query_image_path))
plt.title('Query Image')
plt.axis('off')

for i in range(5):
    class_name, similarity = sorted_results[i]
    image_path = os.path.join(dataset_directory, class_name, os.listdir(os.path.join(dataset_directory, class_name))[0])
    plt.subplot(1, 6, i + 2)
    plt.imshow(Image.open(image_path))
    plt.title(f'{class_name}\nSimilarity: {similarity:.2f}')
    plt.axis('off')

plt.tight_layout()
plt.show()
```

```
WARNING:tensorflow:From C:\Users\Aishwariya\anaconda3\Lib\site-packages\keras\src\losses.py:2976: The name tf.losses.sparse_soft
max_cross_entropy is deprecated. Please use tf.compat.v1.losses.sparse_softmax_cross_entropy instead.

WARNING:tensorflow:From C:\Users\Aishwariya\anaconda3\Lib\site-packages\keras\src\backend.py:1398: The name tf.executing_eagerly
_outside_functions is deprecated. Please use tf.compat.v1.executing_eagerly_outside_functions instead.

WARNING:tensorflow:From C:\Users\Aishwariya\anaconda3\Lib\site-packages\keras\src\layers\pooling\max_pooling2d.py:161: The name
tf.nn.max_pool is deprecated. Please use tf.nn.max_pool2d instead.

Downloading data from https://storage.googleapis.com/tensorflow/keras-applications/vgg16/vgg16_weights_tf_dim_ordering_tf_kernel
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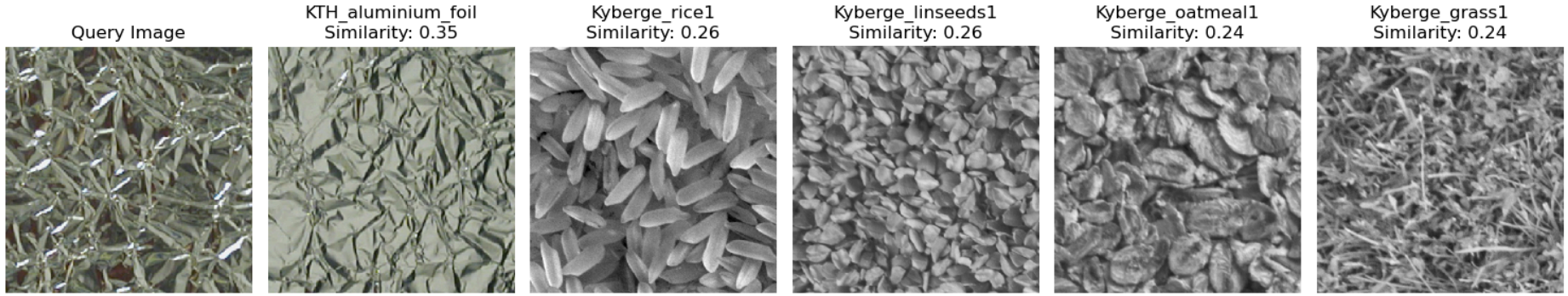

In [ ]: